RAILROAD GAZETTE

FRIDAY, DECEMBER 27, 1895.

CONTENTS

CONTRIBUTIONS:	PAGE.
Steel Making in India	849
The Painting of Iron Work	849
ILLUSTRATIONS:	
C., C., C. & St. L. 36-ft. Stock Car	850
The Pennsylvania Class "L" Locomotive	852
Plant of the Rocky Hill Stone Storage Company	853
Improvement in Engine and Dynamo Building	856
Crown Stays	856
Staybolts	857
Weighing Coal Automatically	857
Wrecking in New Brunswick	857
EDITORIALS:	
American Railroad Securities in the London Market	858
EDITORIAL NOTES	858, 859
New Publications	859
Trade Catalogues	859
GENERAL NEWS:	
Locomotive Building	862
Car Building	862
Bridge Building	862
Meetings and Announcements	863
Personal	864
Elections and Appointments	864
Railroad Construction	864
Electric Railroad Construction	865
General Railroad News	866
Electric Railroad News	866
Traffic	866
MISCELLANEOUS:	
Technical	860
The Scrap Heap	861
Tests of Gas and Lamps for Car Lighting	849
Freight Car Doors and Their Attachments	851
The Cost of Railroad Construction	852
Annual Report of the Interstate Commerce Commission	855
The Simplon Tunnel	855
Compressed Air at Seventy-seven Pounds per Square Inch	855
The Fire in the Bozeman Tunnel	856
Foreign Railroad Notes	857

Contributions.

Steel Making in India.

BIRMINGHAM, ALA., Dec. 10, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with some interest the article under the above title published in your issue of Dec. 13. The figures quoted in the article are not sufficiently detailed to enable any adequate examination to be made, but I am disposed to think that in several cases the figures are understated as to cost. No analysis is given of the ore, and it is not possible, therefore, to judge as to the process which would be required to treat it. A more important question that suggests itself is as to the proposed Indian coke. The analysis given of the Indian coal is not one which would suggest that the coal was a coking coal, but a gas coal. The fitness, however, of coal for coking cannot be demonstrated by analysis, but only by actual experiment, as the physical properties of the coal enter into the question more than the analysis. It would be necessary to know whether this coal is being coked, and if so what is the analysis, and what are the physical properties as to strength, density and cellular structure of the coke before deciding whether the figures put down as the cost of coke should be considered reliable.

IRON MASTER.

The Painting of Iron Work.

WILLIAMSPORT, Pa., Dec. 21, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read the articles on the Painting of Iron Work by "Civil Engineer" with much interest. His review of the papers, discussion, and correspondence, developed by the papers of Mr. Emil Gerber, Mr. M. P. Wood, and Mr. Walter G. Berg, on the above subject, show that he has analyzed the subject well, and his summary contains much valuable information for those who have not taken the time to investigate this important subject.

The discussion of the above subject has developed great energy among the different manufacturers of pigments and vehicles, and they have flooded the country with their circulars, pamphlets and samples of some special oil or pigments. The writer, who has spent a score of years devoted to the above subject, and has carefully watched results, finds that oiling the metal at shops does not weather or protect the metal as well as one coat of paint, also that care is not given in the cleaning of old work that it deserves. In repainting old structures they should be scraped, and all rusty places soaked with benzine, then apply the torch and burn out all the benzine as well as change the yellow (hydrated) oxide of iron to the red (anhydrous) oxide, which will never return to rust again, as anhydrous oxide will never undergo any chemical change in centuries of exposure.

Many enemies of oxide of iron pigments claim and publish that oxide of iron is in itself only iron rust. They are in properties entirely dissimilar. The chemical symbol of oxide of iron is Fe_2O_3; iron rust is hydrated oxide of iron. It is never used as a paint pigment upon iron or steel by those manufacturers who have made a study of their business, while upon wood its use is unobjectionable. (Its chemical symbol is $Fe_2O_3\ 3HO_2$.) If the reader wishes to make a very nice experiment, all he has to do is to put some iron rust in an iron spoon and put it in the fire until it gets red hot, then take it out and he will see the change in color, It has taken up one more part of oxygen, which makes it oxide of iron; no farther change can take place in this by exposure to the air or moisture, which makes it the most durable color. For the above reason Mr. G. H. Thomson's theory of removing rust with fire is the most scientific (see the *Transactions* of the American Society of Civil Engineers, Vol. XXXIII, pp, 541-542), and without question it is the best method known for preparing metal to receive paint. As absolutely clean metal in clean water or pure air will never corrode, how important is this subject of having a clean structure to receive the first coat of paint, if satisfactory results are to be expected. Then the paint manufacturer will get the credit that he deserves.

The manufacturers of red lead, with their tremendous energy and millions of capital, have boomed red lead as a pigment for paint, and many claims are made for it that are extravagant and unreasonable. Red lead of itself is the most difficult pigment to apply and cover the metal well. The writer has seen many contracts where red lead was used, and none where the workmanship was satisfactory. If we could not make our paint cover any better it would be condemned. Red lead, when applied, forms a kind of cement with the linseed oil, which saponifies to a great extent, and the gummy, elastic nature of the oil is destroyed, and it dries so hard that it is not elastic, and does not expand and contract with the metal. The objections to the use of red lead are: 1st, it runs and streaks; 2d, it cakes and soon becomes so hard that there is great waste; 3d, it is poisonous to the workman; 4th, it fades quickly; 5th, its cost; 6th, its cost in application; 7th, it holds so much oxygen that it combines with the metal, forming a coat of black oxide beneath the paint. Its chemical symbol is Pb_3O_4. There is no other pigment known that contains so much oxygen, or that holds it so loosely, or gives it up so readily as red lead, holding it much as a sponge holds water When red lead is brought into contact with something for which the oxygen has greater affinity than it has for the lead, it at once leaves the lead and combines with its affinity.

Linseed oil and iron both have greater affinity for oxygen than for lead, hence it readily combines with both of these, which causes the oil to dry quickly. If iron is painted with red lead pigment corrosion is not prevented, but produced, the second and third coats acting exactly like the first, piling up the hydrated oxide of iron in the rear, keeping it out of sight, and the rusting goes on just the same. This last statement may seem extravagant; the writer has seen the original that the photograph was made from, as shown in the Prince Manufacturing Company's pamphlet, taken from an iron ship; he has also seen the same results in the engineering office of two of our large railroads in Providence and Boston. The manufacturers recognize many of the above faults, as all their literature proves, as they give formulas and advise the use of lampblack and make every effort to make a satisfactory appearance and apology for its cost. As "Civil Engineer" did justice to all and made a thorough review of the subject his summary agrees with my long experience as a manufacturer, salesman and observer of results, that anhydrous oxide of iron is the "pigment of pigments," as proved by the correspondence of Mr. Robert Moore, M. Am. Soc. C. E. (See the *Transactions* of the American Society of Civil Engineers, Vol. XXXIII., p. 560.)

W. H. LOOMIS, *of National Paint Works.*

Tests of Gas and Lamps for Car Lighting.

We are permitted to publish the following report of an investigation of lamps and gases for car lighting. The investigation was made by Prof. W. H. Chandler, of Lehigh University, and Prof. J. E. Denton, of Stevens Institute, for Col. Rollin H. Wilbur, General Superintendent Lehigh Valley Railroad, to whom the report is addressed. We omit the very detailed tables which accompany the report. The conclusions from these tables, as reached by the distinguished gentlemen who sign the report, will be found conveniently summed up. They agree very closely with the results reached by Dr. E. G. Love, of New York, in an investigation which he made for the *Railroad Gazette* a number of months ago, the gist of which was published in our issue of June 7, 1895. The report now published is dated Nov. 1, 1895.

"We have to report as follows upon the comparative illminating powers of the Pintsch Argand and Gordon-Mitchell Argand lamps for lighting railroad cars with compressed Pintsch gas and compressed city water gas, as determined by tests conducted by us in Lehigh Valley chair car No. 10 on Oct. 3 and 4, 1895.

"This car had one of its 18.7 cu. ft. cylinders charged with city gas at about 17 atms. and another with Pintsch gas under about 8½ atms., at Jersey City, the city gas being drawn from the storage tanks of the Pennsylvania Railroad's compressing station, and the Pintsch gas being supplied from the Pintsch plant of the D., L. & W. R. R.. at Hoboken. . . . The Pintsch lamps were adjusted and operated by Mr. Stevens, of the Pintsch Company, and the Gordon-Mitchell lamps were handled by Mr. Gordon. . . .

"*General Description of Tests.*—A horizontal bar photometer was erected in the center of the aisle at one end of the saloon, and the space which it occupied was curtained off by a thick black cloth screen, which was stretched across the car about midway between the first and second lamps. The disc of the photometer was about six inches square, and it was mounted in a box which fitted a hole in the screen, so that the whole of the disc was exposed to the light from any, or all, of the four lamps in the saloon, in front of the screen. The disc was hung on an axis parallel to its plane, which permitted the latter to be adjusted to any angle. The candles were mounted on a carriage, which was movable horizontally on the photometer bar. An accurate candle balance was provided, and the candles were calibrated before and after each test.

Each style of lamp was tested with both kinds of gas as follows:

"1st. To determine the general illumination, or the relative aggregate illuminating power, of the four lamps in front of the screen at a point in the center of the aisle about 50 in. from the floor of the car, and about 48 in. back from the center of the first four of the lamps, with the lamps adjusted to the average rate of consumption for regular car service, which was about

3.3	cu. ft.	per	hour	for	Pintsch	gas	in the Pintsch lamp.
3.3	"	"	"	"	"	"	G. M. "
7.2	"	"	"	city	"	"	Pintsch "
7.2	"	"	"	"	"	"	G. M. "

"2d. To determine the candle-power of one of each of the two styles of lamps, at angles of 40, 45 and 60 degs. below the horizontal plane through the base of the flame, at the same rate of consumption used in testing the four lamps.

"*General Illumination Tests.*—The base of the flame in the Gordon-Mitchell lamps was situated 2½ in. nearer to the ceiling of the car than in the Pintsch lamp, the brass pendant below the globe, which forms the air inlet in the former lamp, necessitating this difference of level in the particular design of G.-M. lamp used. Consequently the location of the center of the photometer disc at 50 in. above the floor, which was used in the Pintsch tests of the Pintsch lamps, and which made the base of their flames 40¾ in. above the disc, placed the latter 43¼ in. below the flames of the G.-M. lamps. This difference more than compensated for any effect upon the disc which the G.-M. lamps derived from the ceiling reflection due to the ceiling being 2½ in. nearer to the flame than it was to the Pintsch flame.

"Hence, tests of the G.-M. lamps were made with the center of the photometer disc at both 40¾ in. and 43¼ in. below the base of the flame, or at both 50 in. and 52½ in. above the floor; while the Pintsch lamp was tested with the disc at 50 in. above the floor only. The horizontal distance from the center of the photometer disc to the center of the first of the four lamps was 48 in. in all of the tests. Observations were made at each height with the photometer disc at about 70, 75, 80 and 90 degs. to the horizontal, respectively; the average of the photometric results for these conditions being regarded as a fair equivalent of the best effect of each of the four lights upon the disc. . . .

"Our conclusions from this four lamp data, with Pintsch lamp 40¾ in. and the G.-M. lamp 43¼ in. above the center of the photometer disc, are as follows:

"1. The Pintsch lamp burning Pintsch gas averaged, for the four angles, 1.76 times as much light as the same lamp with city gas, and the latter consumed 2.2 times as much gas. Hence, for equal illumination the Pintsch lamp consumed 3.87 times the amount of city gas as was required of Pintsch gas.

"2. The Pintsch lamp with Pintsch gas averaged 1.82 times as much light as the G.-M. lamp with Pintsch gas, and the latter consumed 1.003 times as much gas. Hence, for equal illumination, the G.-M. lamp consumed 1.83 times the amount of gas required by the Pintsch lamp.

"3. The Pintsch lamp with Pintsch gas averaged 1.7 times as much light as the G.-M. lamp with city gas, and the latter consumed 2.21 times as much gas. Hence, for equal illumination, the G.-M. lamp consumed 3.78 times the amount of gas required by the Pintsch lamp.

"Our conclusions from the four-lamp data with both lamps 40¾ in. above the center of the photometer disc are as follows:

"1. The Pintsch lamp with Pintsch gas averaged 1.583 times as much light as the G.-M. lamp with Pintsch gas, and the latter consumed 1.003 times as much gas. Hence, for equal illumination, the G.-M. lamp consumed 1.59 times the amount of gas required by the Pintsch lamp.

"2. The Pintsch lamp burning Pintsch gas averaged for the four angles 1.78 times as much light as the same lamp with city gas, and the latter consumed 2.2 times as much gas. Hence, for equal illumination, the Pintsch lamp consumed 3.87 times the amount of city gas as was required of Pintsch gas.

"3. The Pintsch lamp with Pintsch gas averaged 1.555 imes as much light as the G–M lamp with city gas, and the latter consumed 2.21 times as much gas. Hence, for equal illumination, the G–M lamp consumed 3.44 times the amount of gas required by the Pintsch lamp.

"4. The G–M lamp with city gas averaged 1.13 times as much light as the Pintsch lamp with city gas and consumed 1.006 times as much gas. Hence, for equal illumination, the Pintsch lamp consumed 1.11 times the amount of the gas required by the G–M lamp.

This general illumination test was proposed by Prof W. H. Chandler, and developed by Prof. Denton and himself.

"*Tests of Single Lamps.*—It was concluded from visual observations, that the ceiling illumination of both lamps was practically the same, and that the relative candle power for car illumination might fairly be determined by comparing the average candle power at 40, 45 and 60 degrees below the horizontal plant through the base of the flames, the plane of the photometer disc being at right angles to these directions, respectively.

"The measurements were confined to the first of the four lamps, which lamp was adjusted to practically the same rate of consumption as that of the four lamps. . . . We draw the following conclusions:

"1. With the Pintsch lamp and Pintsch gas the average candle power per cubic foot of gas per hour was 15.9, and the average candle power was 54.3.

"2. With the Pintsch lamp using city gas the average candle power per cubic foot per hour was 4.4, and the average candle power 31.3.

"3. With the G-M lamp using Pintsch gas the average candle power per cubic foot per hour was 7.5, and with

city gas 3.6; the average candle power being 25.2 and 27.8 respectively.

"Table XVI. gives the relative amount of gas per hour for equal illumination, that for the Pintsch lamp, with its own gas, being taken as unity. It shows that to obtain a given amount of illumination for each cubic foot of Pintsch gas consumed by the Pintsch lamp, the G-M lamp with Pintsch gas uses 2.12 cu. ft.; the G M lamp with city gas uses 4.4 cu. ft., and the Pintsch lamp with city gas uses 3.6 cu. ft.

"*General Conclusion.*—The average of the results from both the single lamp tests and the general illumination tests, in which both lamps were at the same distance from the photometer, afford the following general conclusions:

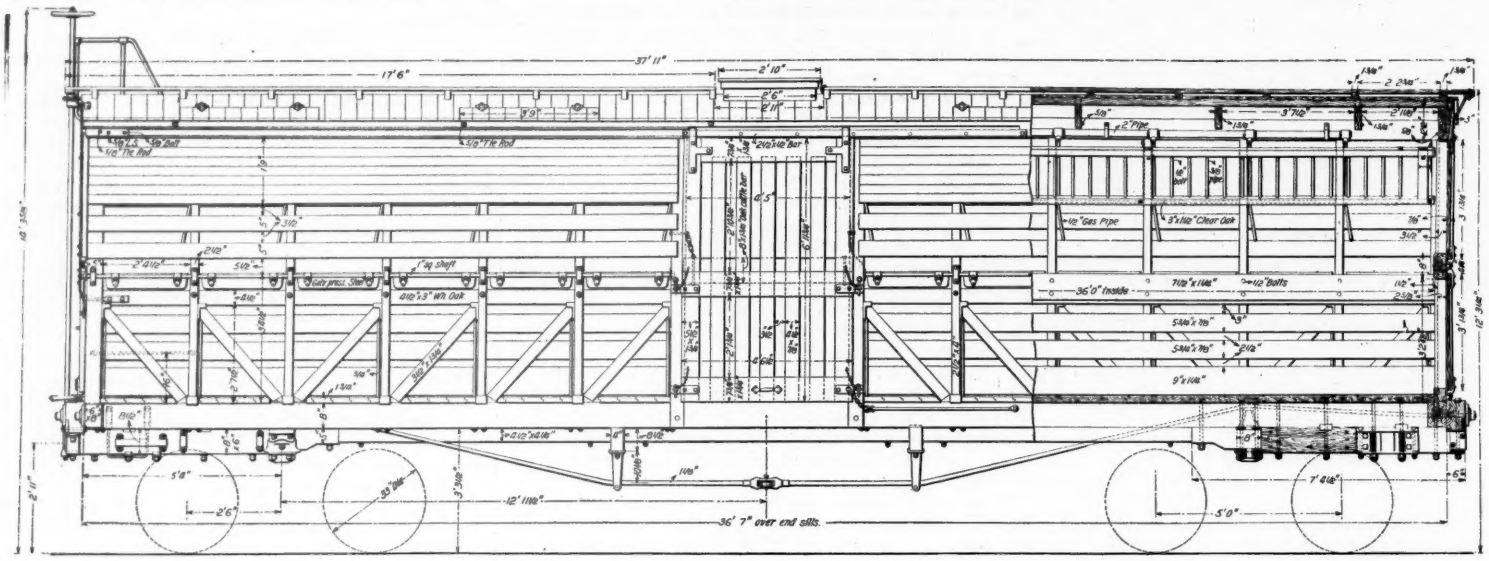
"The useful illuminating power of the Pintsch Argand lamp in a car burning Delaware & Lackawanna Pintsch gas at the rate of 3.3 cu. ft. per hour is 3.73 times the amount which is afforded per cubic feet, by the same lamp burning compressed Jersey City gas at the rate of about 7.2 cu. ft. per hour; 1.71 times the amount afforded per cubic foot by the G-M lamp burning Pintsch gas at the rate of about 3.3 cu. ft. per hour and 3.92 times the amount afforded per cubic foot by the G-M lamp burning compressed Jersey City water gas at the rate of about 7.2 cu. ft. per hour.

"We shall submit you later the results of our estimate of the probable cost of charging your cars with compressed city gas at Phillipsburg, and of the total cost of using city gas compared with that of using Pintsch gas."

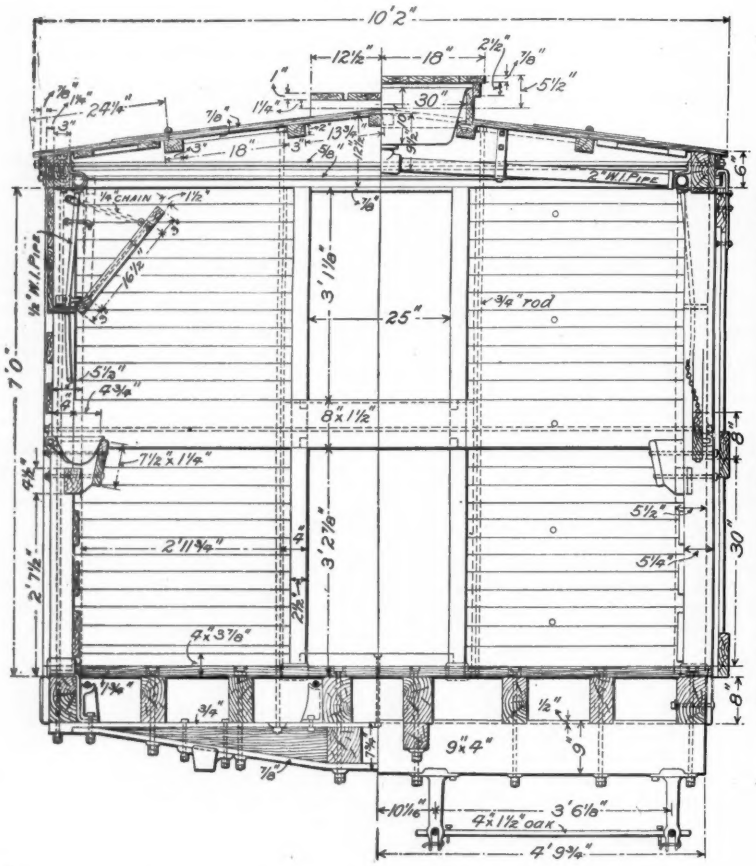
W. H. Chandler,
J. E. Denton.

C. C., C. & St. L. 36-Ft. Stock Car.

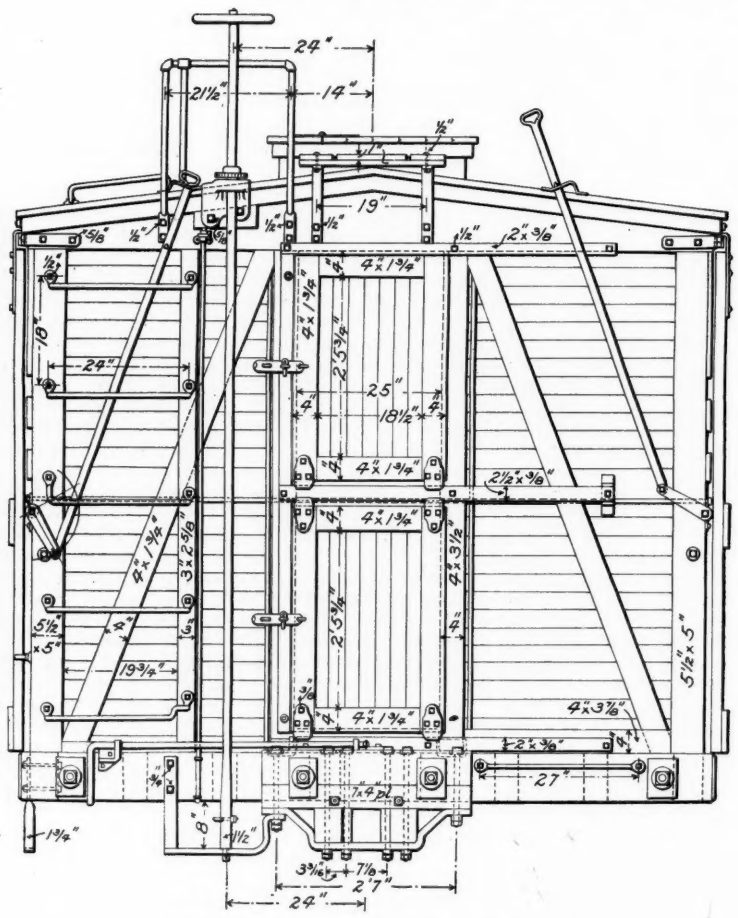
A number of new 36-ft. stock cars have of late been built for the Cleveland, Cincinnati, Chicago & St. Louis Railway, which, besides being very good examples of this class of car, present some new features, especially in the arrangement of the feeding and watering attachments. These Mr. Garstang, Superintendent of Motive Power, says, differ from any in use heretofore, and are believed to possess improvements that are valuable. The cars were built from designs of Mr. Garstang, assisted by Mr. T. A. Lawes, Mechanical Engineer of the road. We are indebted to the former for the drawings and specifications given herewith. The cars are equipped with the Westinghouse automatic air-brake in connection with which are used National hollow brake beams with the Christie brake head and shoe. The Gould coupler is used. We give below the general dimensions of the car and some of the more important clauses of the specifications:



Longitudinal Section and Side View Showing Framing—C., C., C. & St. L. Stock Car.



Transverse Sections—C., C., C. & St. L. Stock Car.



End View—C., C., C. & St. L. Stock Car.

General Dimensions.

Length outside of end sills	36 ft. 7 in.
Width outside of side sills	9 ft. 7½ in.
Height from top of side sill to bottom of plate	7 ft.
Height from bottom of side sill to top of plate	8 ft. 2 in.
Height of door	7 ft.
Distance between door posts	4 ft. 5 in.

Material.—Side, center and intermediate sills and flooring, Norway pine; end sills, carlines, posts, braces, draw timbers, needle beams, truck bolsters and slatting, white oak: roofing boards, white pine.

Iron Body Bolster.—Top piece to be made of ¾-in. × 8-in. iron, with ends upset. Bottom piece ⅛ in. × 8 in., secured to side sills with one ¾-in. bolt at each end, and a ¾-in. rod passing from top of plate through side sills and bolsters. Intermediate sills to be fastened with one ¾-in. bolt. Through center sills draw timbers and center plates with two ⅞-in. bolts passing through each center sill.

Flooring.—To be Norway pine, 1¾ in. thick by 5¼ in. wide, ship lap, and nailed with two 4-in. No. 5 barbed wire nails at each bearing. All bolts passing through floor, center sills, and draw timbers to receive each a cast cup washer let in flush with floor, each bolt to be double nutted.

End Plates.—To have double tenons and secured to side plates by ⅝-in. tie rods crossing from plate to plate, and through corner bands.

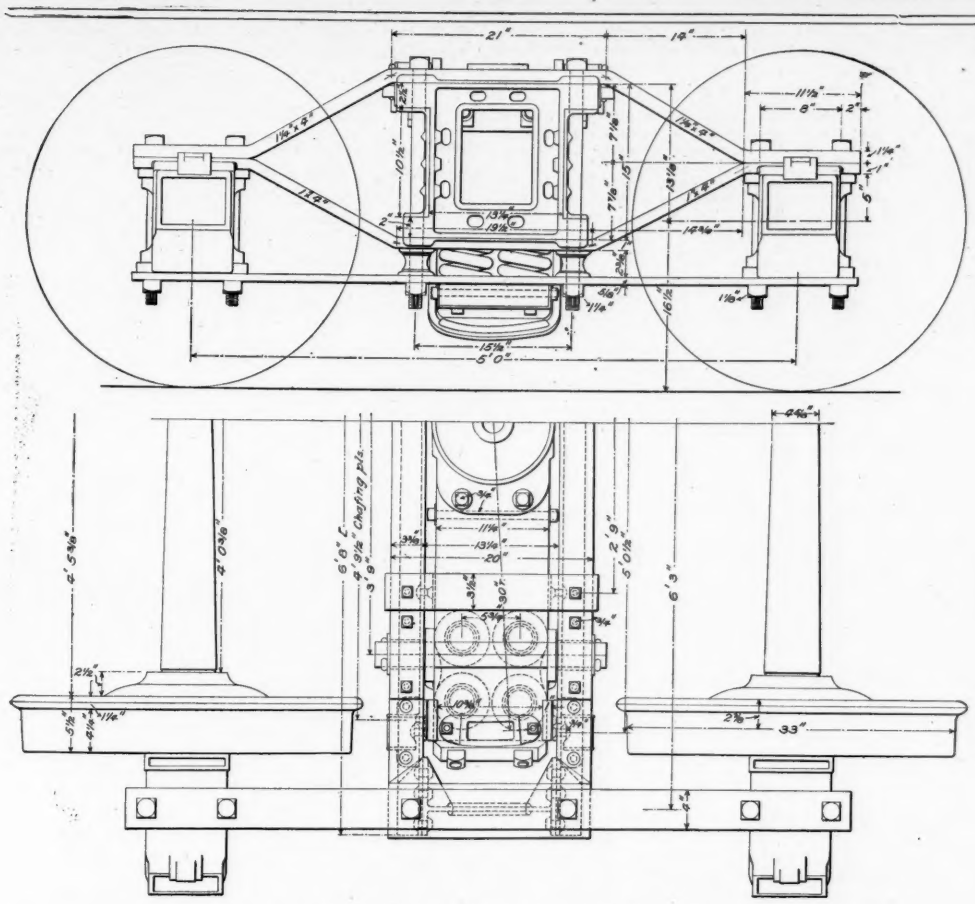
Carlines.—Ten carlines to have double tenons and secured to side plate by ⅝-in. tie rods crossing from plate to plate, and by the molding.

Posts.—Each body post and brace shall be supported by a malleable iron pocket resting on side sill. All posts and sills under pockets are to be well painted before application of pockets to sills.

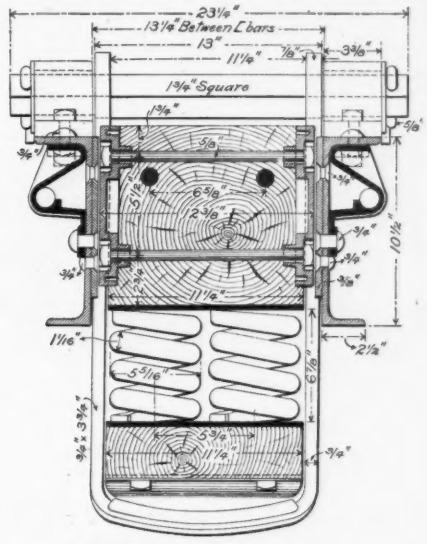
Hay Rack.—Hay rack stiles and rails are white oak. Stiles tenoned through rails and secured by two ⅜-in. oak dowels. There are 25 pieces of ⅝-in. gas pipe bored into top and bottom rails 1¼-in. deep. Hay rack hinges are made of 1½-in. × ⅜-in. wrought iron, secured to posts by ½-in. bolts and to bottom rail by ⅜-in. eyebolts.

Hay Rack Sills.—There are 24 hay-rack sills cut between the body post, filling the space between sheathing and rack. They will be toe-nailed into each post with four 2½ No. 10 barbed wire nails. The outside sheathing will also be nailed through sheathing into rack sills, four nails to each sill. The racks will be held in feeding position by three ¼-in. chains secured by hook bolts. When hay rack is folded up against side posts it is held by two hooks and eyebolts.

Water Tank.—Water tank is ⅛ in. sheet steel; is located in center of roof and secured to same by 2 in. No. 16 wood screws; cover forming . . . running board,



Side View and Plan of Truck—C., C., C. & St. L. Stock Car.



Longitndinal Section of Truck.

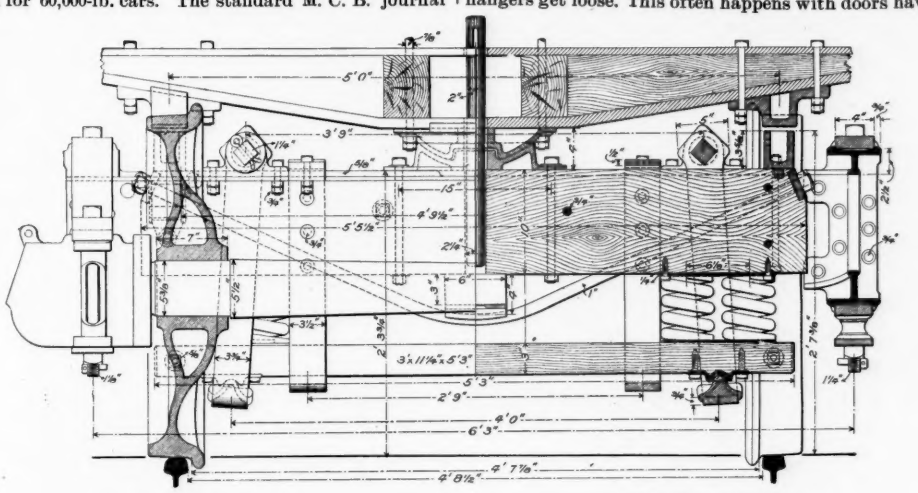
Water Troughs.—To be of galvanized iron or pressed steel. There are 24 troughs to each car.

Trough Levers and Connections.—Troughs rotate by the motion of a square shaft, of which there are four to each car. The trough attachment to the square rod is a malleable casting riveted to trough.

Water-piping.—Tank pipe is 2-in. black iron, connected to tank by a malleable iron screwed flange with bolts. The down pipes are ½ in. diameter, the ends of which are to be reduced so they will fill the troughs in equal time.

The trucks are shown in the accompanying engravings. They are of the swing motion type with 33-in. wheels, conforming to the wheel specifications of the road and weigh 5,800 lbs. each. The trucks have a spread of 5 ft. The upper arch bars are 1¼ in. × 4 in. iron. The inverted bars are 1 in. × 4 in. The pedestal tie bar is ⅝ in. × 4 in. iron. The axles are of steel conforming to the specifications of the road for 60,000-lb. cars. The standard M. C. B. journal boxes have Morris pressed steel covers and malleable iron keys. Journal bearings are made of seven parts lake copper to one part of Strait's tin. The channel bars are 10½ in. high and ⅜ in. thick, the upper flange 3⅜ in. and the lower 2½ in. The spring planks are made of 3-in. oak set upon malleable iron bearings. The bolster springs are class "W," guaranteed for five years. The bolster is white oak 10 in. × 11¼ in. trussed with two 1 in. rods with 1⅛ in. upset ends. Each truck has two wrought iron hangers of ¾-in. × 3⅜-in. iron; also safety hangers of ¾-in. × 3½-in. iron. Each bolster has four malleable iron truck bolster chafing plates. The center plates are bolted on with 4¾-in. bolts passing through the bolster. All these details are shown in the engravings of the truck.

The cars are painted with the C., C., C. & St. L. standard freight car paint. This paint is specified to be equal to the Sherwin-Williams Company's "No. 3 perfect method" paint. Is is guaranteed for 10 years' service, each car having three coats. All iron work is, as usual, covered with asphaltum black paint. The engravings show, besides the details of the truck, a side view of the car, showing the framing, a cross section end view, details of side and roof construction, etc. The outer sheathing of the car is of white pine, kiln dried. The side doors are of 1¾-in. white oak, with wrought iron door fittings. The roof is single boarded, white pine, with the roof doors located as shown in the engraving of the top of the car. There is a 25-in. running board.



Section Through Axle | *Section Through Bolster.*

Transverse Sections of Truck—C., C., C. & St. L. Stock Car.

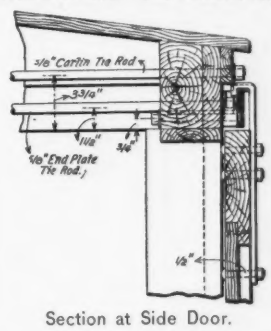
Freight Car Doors and Their Attachments.

At the November meeting of the Western Railway Club there was a discussion on the topic of Freight Car Doors and their attachments.

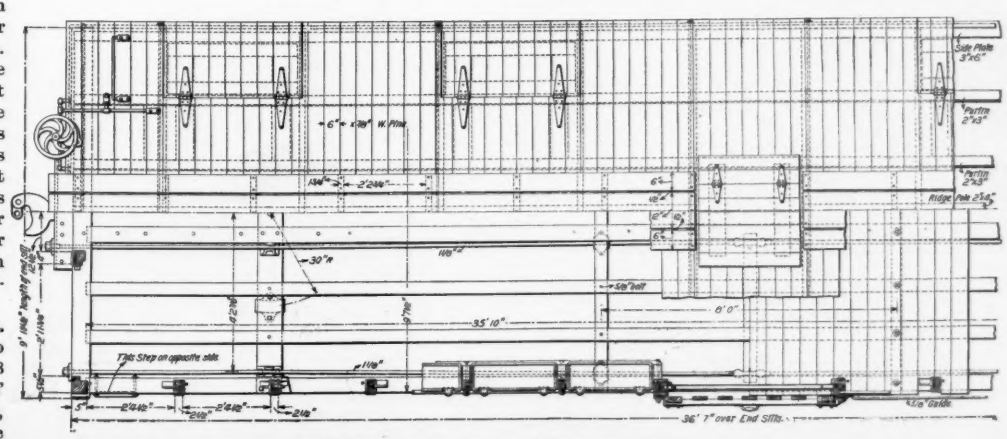
Mr. THOMAS FILDES (Lake Shore), as a member of the N. C. B. Association committee did not feel at liberty to discuss the subject. He said, however, that there are certain points to which attention should be directed. A door should be so fastened that there would be no danger of its falling off when the wood shrinks and shoes or hangers get loose. This often happens with doors having shoes at top and bottom and sliding on a bottom rail. He has found the same thing to happen with the old style wrought iron hanger on doors hung from the top rail. In the shrinking of the lumber the distance from the top of the door to the lip of the hanger sometimes becomes greater than the width of rail, allowing the door to come off easily. He has seen them come off in this way in switching.

Mr. A. M. WAITT (Lake Shore): In the past year we have had several instances of doors coming off freight cars when a passenger train was going by on the next track, and as a result the swinging door struck the passenger train. In many of the cases referred to the cars were old style; in one recent case it was a box car that was never built with truss rods. Some were old style doors, being hung at the bottom on the rail with cast iron shoes, and held at the top by a wooden cap rabbetted and lapped down over the outside of the door, letting the door project into the inside of the rabbet perhaps ¾ of an inch. Evidently the car had been sagged or buckled to a certain extent by the application of air brakes on the four, five or ten cars at the forward end of the train. This box car without truss rods, which in a train with ordinary brakes might not have given trouble, sagged enough to allow the door to rise and the shoe to come clear of the top of the rail. One matter that we can look into more carefully is the inspection of box cars of this class that are offered in interchange. They are dangerous to handle. At the present time we have some of them; we are disposing of them by making them scrap as rapidly as possible. There are some that we are running, but we do not intend to ask our neighbors to accept them, and we do not intend to load them with freight for other lines; if they do get loaded we do not ask others to take them, but we transfer the load; neither do we wish to take such cars from other people.

As a general rule no car ought to be run with doors supported on the bottom rail. It is a pretty broad statement to make, but I have never yet seen any style of fastening where the door was supported entirely by the bottom rail that I believed was safe. The bottom rails are liable to become bent by loading or unloading freight, by a wagon backing into them in a yard, or as a result of a car being wrecked. They are also liable to sag from the bolts becoming loose (the rail sagging), or on account of the cars not being trussed up properly. Any of these features is liable to allow the shoe to rise above the rail. To be sure, there are many doors hung at the top that are not particularly safe, but I believe they have a vast advantage over any style that is supported on the bottom. We have had a case of a certain make of flush doors that are supported on the bottom rail, where the rod that comes up from the shoe (which is supposed to fasten the door in its place) was too short: as a result of that we had one of those doors cause serious trouble on our road. With doors hung at the top I believe the hangers ought to be so constructed that, even though the bolts that fasten them to the doors may become loose, the hanger cannot in any way push up high enough to unhook itself from the top rail. A stop of some kind can be put on the casting, if it is a casting, or



Section at Side Door.



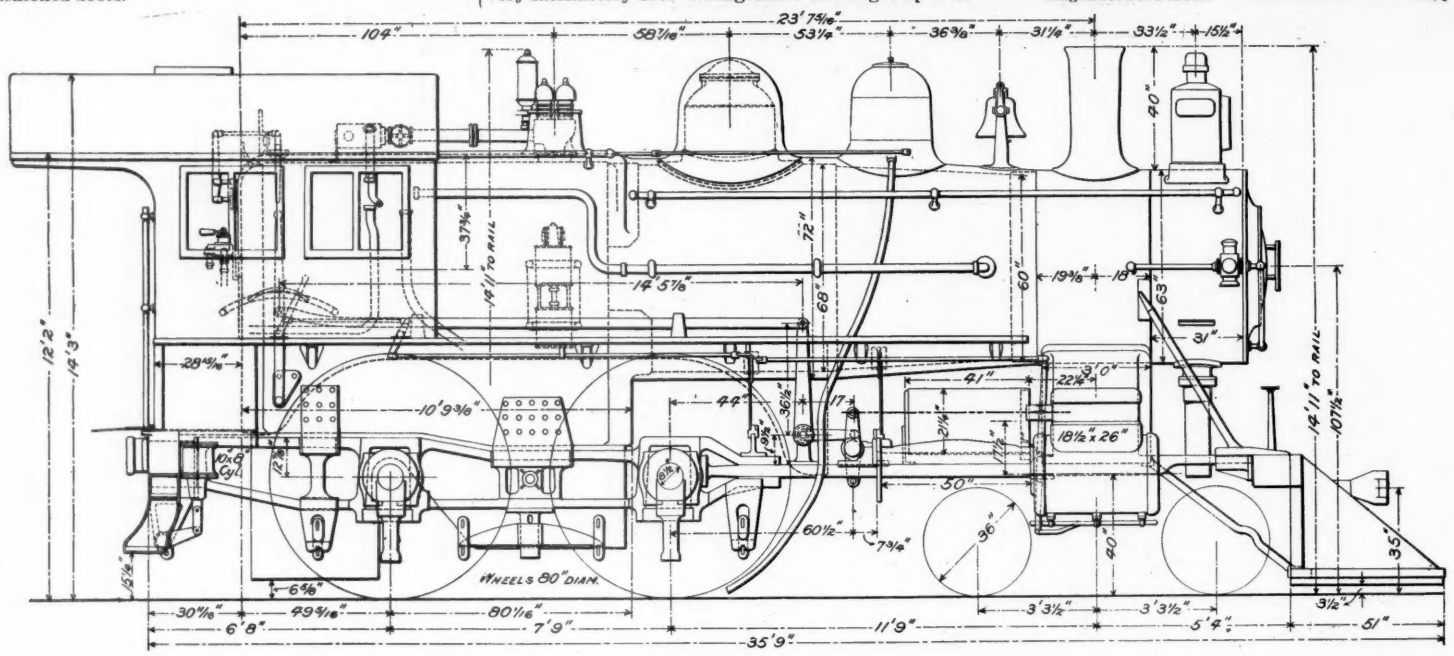
Top Views of C., C., C. & St. L. Stock Car.

on the forging, if it is a forging, to prevent this, and I think that it is a feature that ought to be looked into.

Mr. J. J. HENNESSEY (C. M. & St. P.): It seems to me there is one mistake made by the majority of railroads, in fact I do not know but all of them, and that is whether they have hung their doors at the top or at the bottom, they have kept the door rails only about 2 in. wide. If the rail was made 2½ in. wide, either top or bottom, it would allow the shoe to lap over the rail 1 in. This would prevent the door from falling off. By using a wider door rail we could get a lap of 1 in. of the shoe on the rail; and if it was hung on the top it seems to me there could be a hanger put on that would lap over 1 inch, and after the door was placed in position, there could be a casting or a forging slipped under the hanger and on top of the door, that would prevent the door from being lifted off. I notice, however, that it is a weakness of a great many patent doors, that they are quite as likely to come off as some of the old-fashioned doors.

a mistake, because it necessitates using seals on end doors. What our road has used for a number of years, and what probably most of the roads of the West are using, is inside hooks. Now they are all right if the end door has been hooked on the inside before the side doors are closed, but if they have not been hooked a man taking the seal record of cars has to take it on trust, if the side doors are closed, that these are hooked, and may so report it in his record. Now it seems to me that it ought not to be a very difficult thing, and that it would be a very desirable thing, if end doors were so made that when closed they would be fastened, the same way that you construct the front door of your house, so that when you slam it after you it shuts and you do not have to turn the key in the door to lock it.

President POTTER: I would like to ask you if you consider, from a transportation standpoint, that the flush door is a very decided improvement over the ordinary door? I ask the question for the reason that I think a very satisfactory door arrangement can be got up if we



Pennsylvania Railroad Class "L" Locomotive.

Mr. WM. FORSYTH (C. B. & Q.): In our recent work we have decided that the bottom rail should be done away with. This illustrates very well the importance of co-operation between the different interested departments in railways in establishing a standard of this kind. We were working at this question and were looking at it only from the draftsman, or shop side, and we made a very good design for a door fixture, with a good strong bottom rail, made 2½ × ½ in. But when we came to get these into service we found that our operating department and the people in the yards at the terminals objected and said, "that is not the right kind of a door; you want to do away with the bottom rail." Our old door was made with an oak frame with wooden panels, and those wooden panels were lightly fastened with small nails and were continually being punched out. So we decided to use a batten door. Then, in looking about for a simple trolley or roller for the upper rail, we thought that the simplest and cheapest, and probably as good as any, was the kind used on the Alton road, and so we adopted that little roller which has been used on that road for a long time—a small chilled roller with a cast axle on it. The advantage of the small roller is that the door, although it is a trolley door, has not an anti-friction roller, and it is not continually sliding back and forth in shifting. In the matter of fixtures for the lock, we decided that the staples must be done away with; that burglars were continually pulling out staples and getting the car doors open. Chains and pins were continually being lost and torn off, requiring and replacing, and we wanted to do away with that, so we made an eye fastening on the door stop which was well secured by screws and bolts, and used with that a clasp which combined the pin with it: in other words, it was like a hook and this hook had the slot in it for the seal.

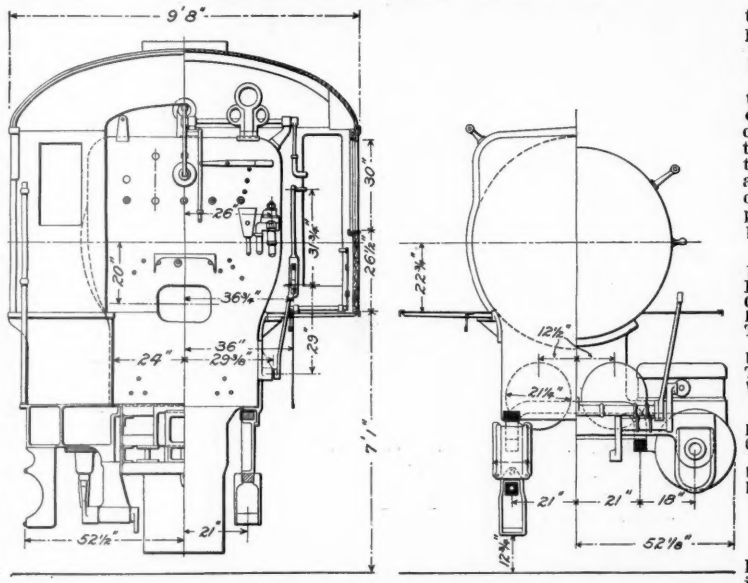
Mr. P. H. PECK (C. & W. I. & Belt Rys.): I presume we handle more kinds of doors than any one in the country. We handle everybody's doors, and I think we have on our line more chicken-coops and pig-pens and other buildings made out of doors than any one else in the city. These doors are lost from cars almost always, as Mr. Waitt says, from being loose and swinging out. We have had several accidents from this cause.

Mr. F. A. DELANO (C. B. & Q. Ry.): I was on a committee that looked into this subject about a year ago at the Chicago terminals of our road, and although what I was about to say is practically covered by what Mr. Forsyth has already said, there are one or two points that might be mentioned. Our first work was to look at cars of the different roads as they appeared in our own yard, and we found that the doors that seemed to show by far the best results in the every day wear and tear of hard usage, were the doors on the Lake Shore cars, and the door which Mr. Forsyth has described contains many of the points that we found in the Lake Shore equipment. The doing away with the slide on the bottom of the door enabled us to take away the bottom rail, which was constantly making trouble; and the rail which used to be formerly on the side of the car is now to be on the bottom of the door and on the inside. This helps to strengthen the door and makes a shorter rail answer the same purpose it did before, namely of keeping the door from swinging out. All that is needed is cast iron lugs to keep the door in.

The end-door construction is similar to the side doors. I think the importance of end doors is often lost sight of. In settling claims, as you probably all know, the road that is able to show a clear seal record does not have to pay the claim, but if a road cannot show a perfect seal record it has to participate in the payment of the claim, whether it is at all responsible or not. Now in taking the seal records, it is a difficult matter enough to take the seal record of the side doors of the car, but it becomes a practically impossible matter to take seals on the end doors. Some roads, I regret to see, are using an outside hasp and staple on end doors. This seems to me

eliminate that feature. But to enable the door to be flush with the siding necessitates getting in those complicated parts which are hard to keep in good order.

Mr. DELANO: Some styles of outside doors are so loosely constructed—in fact, I recall one of the favorite patent doors so constructed—that if freight happened to fall against the door it would bulge out, and I have seen cars loaded with hay where the door was actually bulged out and where the contents of the car might have been set on fire by sparks from the engine. But a well constructed side door I do not think does that. It often occurs from doors being pushed off at the bottom run, but I think that difficulty will be eliminated by a good side door construction, and if the door laps over enough I do not think there is any danger of damage from wetting the contents in any close-fitting door. In the door that Mr. Forsyth has described, and also in the Lake Shore door, the bottom slide which is on the door itself is thickened—in the case of the Lake Shore by riveting



Pennsylvania Class "L" Locomotive.

on a little bevelled piece of iron, and in our door simply with a button head rivet. Thus when the door is closed those rivets come opposite the cast iron lugs and press the door securely against the side of the car. Accordingly, although it is an outside door, it is pressed against the side sheeting of the car so that there is not a leak for snow or water.

The Pennsylvania Class "L" Locomotive.

In our issue of Dec. 13, p. 820, we gave some account of two fast runs in heavy service by a new Class "L" locomotive of the Pennsylvania Railroad. We show now the general arrangement of that engine and details of the piston and piston-rod. Those who wish to compare this engine with the class "P" should turn to our issue of Feb. 22, 1895, and they should read also the description of the runs mentioned above. Some of the dimensions follow:

Weight on drivers	91,600 lbs.
" " truck wheels	43,200 lbs.
" total	134,800 lbs.
Wheel base, total, of engine	22 ft. 9½ in.
" " driving	7 ft. 9 in.
Height, center of boiler above rails	107½ in.
" of stack " "	14 ft. 11 in.
Heating surface, firebox	148 sq. ft.
" " tubes	1,746.6 sq. ft.
Grate area	33 sq. ft.
Drivers, diameter	80 in.
Truck wheels, diameter	36 in.
Cylinders, diameter	18½ in.
Piston, stroke	26 in.
Working steam pressure	185 lbs.
Tubes, number	310
" outside diameter	1⅞ in.
" length between sheets	136¾ in.
Firebox, length	9 ft. 11⅝ in.
" width	40 in.

The engine is fitted with driver- and truck-brakes and the tender with a water scoop.

The Cost of Railroad Construction.*

BY JOHN F. WALLACE, *Chief Engineer Illinois Central Railroad.*

The factors which determine the cost of railroad construction are varied, and are affected by local influences and time conditions. Railroads have been built across the prairies of the states lying between the Alleghany and Rocky Mountains that did not involve a cash outlay, including equipment, exceeding $15,000 per mile. On the other hand, trunk lines have been built between important cities, some sections of which have cost as much as $100,000 per mile.

Railroad construction in the United States might properly be divided into three distinct classes, as follows:

First: Trunk line construction—that is, construction of lines between prominent cities, with everything up to the standard of the American trunk line railroads. The average cost per mile of a line of this character at the present time would be approximately as follows:

Right of way	$2,000
Bridges and culverts	4,000
Graduation	12,000
Ballast	3,000
Track material and laying	7,000
Fencing	400
Telegraph	250
Water supply, station buildings, round houses, etc.	1,200
Engineering	700
General and legal expenses	600
Proportion of terminals.	5,000
Equipment	4,000
	$40,150

East of the Mississippi Valley this estimate would be increased by additional cost under such items as right of way, bridges and culverts, graduation, etc. West of the Mississippi Valley, in the mountainous country, the cost of bridges, culverts and graduation would be increased in the construction of long trunk lines, and the cost of terminals would be diminished. This sample estimate, however, will fairly show the average cost of the ordinary trunk line in the central portion of the United States. To this amount should be added the cost of financiering, which is not usually taken into estimates of this kind; experience in railroad promotion has shown that new lines necessarily have to dispose of their securities at a discount, whereas interest has to be paid on the face value. A discount of 10, 15 or 20 per cent. on the bonds of an enterprise of this kind is not unusual, which would increase the above cost to approximately $50,000 per mile.

Second: Main lines of roads which do not form parts of through trunk lines, but which connect towns and

*Extracts from a paper in the *Engineering Magazine.*

cities of secondary importance, and upon which alignments and grades can be adopted that will admit of economical construction. A sample estimate of the average cost per mile of a line of this character, under present conditions, would be substantially as follows:

Right of way	$1,500	Water supply, station buildings, round-houses, etc.	$800
Proportion of terminals	1,500	Engineering	500
Bridges and culverts	2,500	General and legal expenses	400
Graduation	6,000	Equipment	2,500
Track material and laying	6,500		
Ballast	2,500		
Telegraph	250		
Fencing	400		
			$25,350

Third: Branch lines—that is, lines tributary to existing railroads, comparatively short, whose function is simply to bring passengers and freight to junction points with main lines, to do which two passenger trains and and possibly three or four freight trains daily would fulfill maximum requirements; lines on which, also, heavier grades and sharper curves can be used, where desired, in order to lessen the cost of construction without materially increasing the cost of maintenance and operation. The average cost of a line of this character would be about as follows:

Right of way	$1,000	Water supply station buildings, round-houses, etc.	$500
Proportion of terminals	500	Engineering	400
Bridges and culverts	1,500	General and legal expenses	200
Graduation	3,000	Equipment	1,500
Track material and laying	6 000		
Fencing	300		
Telegraph	200		
			$15,100

The value of right of way depends, of course, on local conditions. In the construction of lines across prairie country, where the building of the road will be of more or less local benefit, donations of right of way are frequently made, or the prices modified. Under ordinary circumstances, however, the average cost of right of way will be substantially double the usual local market value of the real estate. But, when it is necessary to secure a right of way in a thickly-settled portion of the country already under cultivation and well supplied with railroads, and where the property is cut diagonally, it is frequently necessary to pay four or five times the ordinary local value of the real estate actually occupied by the right of way; and it is sometimes necessary to purchase more land than is actually required in order to make satisfactory settlements. It is true that the right of condemnation can be and is frequently utilized, but this mode of obtaining possession restricts the use of the property to railroad purposes. The best railroad managers prefer a deed in fee simple.

The cost of right of way is continually increasing year by year, as the country becomes more settled and land in consequence rises in value, and as the feeling of the necessity for additional railroad facilities diminishes in the minds of the general public.

The cost of bridges and culverts is continually increasing, due to:

(*a*) The fact that rolling-stock and equipment are increasing in weight. During the past 25 years the average weight of locomotives and loaded cars has doubled, requiring bridges and culverts of proportionately stronger construction.

(*b*) The fact that the ideas of engineers and railroad managers are tending toward stronger and safer structures, and that a greater surplus of material is being used in iron and steel structures, particularly on shorter spans than was formerly considered requisite to safety.

The cost per cubic yard of this excavation and fill has been gradually decreasing, on account of the improvements in the methods and machinery adopted for work of this character. On the other hand, the quantity of material considered necessary for railroad construction has increased. In the past 20 years the standard cross-section for embankments has been enlarged from 14 ft. to 18 ft. in width at sub-grade; excavations, from 20 ft. to 28 ft.

Under the head of track is considered the cost of ties, which has been steadily advancing year by year. The cost of grade ties has been substantially doubled in the Mississippi valley in the past 30 years. This item is also affected by an increase in the quantity used, the number of ties to the mile having been increased on first-class roads from an average of 2,640 to about 3,000. As to rails, while it is true that there has been a steady and uniform decrease in the price of steel during the last quarter of a century, the average standard weight of rail for main lines has at the same time increased from 60 lbs. to 90 lbs. per yard, and the quality has materially depreciated. As an example of the deterioration that has taken place in quality, the writer may state that during the past year he has relieved from a main track on tangents rails that weighed 75 lbs. to the yard which had been in the track only five years, whereas, on the same district and under precisely the same traffic conditions, there still remain in the track 60-lb. rails that have been in service for over 15 years, which it was not considered necessary to renew this season. While this may be an exceptional case, the writer considers the steel rail which was furnished by the manufacturers 15 to 20 years ago about 50 per cent. better than the rail now manufactured. This is not intended to apply to special high-class rails, which may be furnished by a few rolling mills under superior specifications, but to ths ordinary rail supplied to and purchased by the majority of the railroads in the United States to-day. The reason of this inferiority hardly comes within the scope of this article.

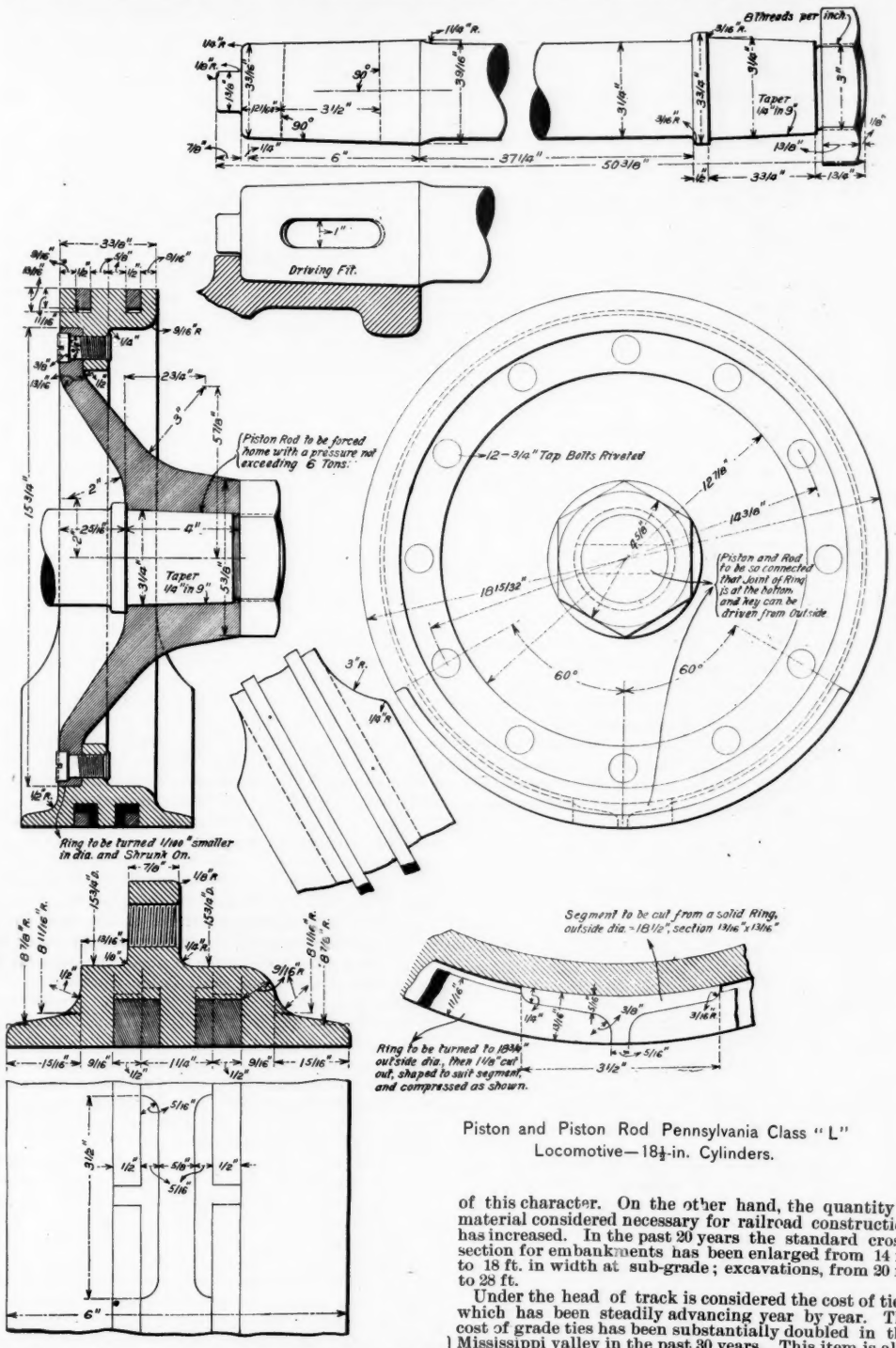
The cost of equipment is practically the same as it was a quarter of a century ago. While engines have been increased in size and weight, cars in strength and capacity, and coaches and sleepers in elegance and accommodation, a corresponding decrease has taken place in the price of the material and machinery used in their construction. There has also been a fierce competition between large corporations engaged in the manufacture of different articles of railroad equipment, which has had an influence in lowering prices.

In the foregoing estimates and remarks two items of considerable importance have been mentioned, which we may consider further.

The cost of railroad construction has been materially increased of late by the necessity of providing crossings for the new lines over existing roads. In the earlier years of railroad construction, if the junior road would agree to put in the crossing frogs and maintain them, the senior road was satisfied. Now the senior road frequently requires the junior road to construct its line over or under the existing road. The expense of a crossing of this character varies from $10,000 to $100,000, according to local conditions. Even if an over or under crossing is not insisted upon, expensive interlocking plants are required, which entail additional burdens on the new road, not only in the first cost of construction, but in operation and maintenance as well.

The most important item of cost in railroad construction, however, is that of terminal expenses in the larger cities. This expense has now become so great in the leading cities that new roads usually prefer to rent their terminal facilities from existing lines. In Chicago today there are roads paying a rental for terminal facilities—and restricted terminal facilities at that—equal to the interest on $10,000,000. In order to emphasize the importance of this item, the writer will assert that, if a new line of railroad were built from Kansas City to Chicago by way of St. Louis, with adequate independent terminal facilities in these three cities, the cost of the terminals would be in excess of the cost of the remainder of the road fully equipped.

The total cost of railroad construction is continually increasing year by year. While some items may have been cheapened on account of the lower price of material or labor, or by competition, other items are increasing in much larger proportion; and the public requirements of safety, speed and convenience are steadily adding items of cost which in former years were not considered necessary; among them, superior character of the roadbed, block and interlocking signals, air-brakes, patent couplers, special cars for high class products, etc.


8 Threads per inch
Taper 1/4" in 9"
Driving Fit.
Piston Rod to be forced home with a pressure not exceeding 6 Tons.
12—3/4" Tap Bolts Riveted
Piston and Rod to be so connected that Joint of Ring is at the bottom, and key can be driven from Outside
Ring to be turned 1/100" smaller in dia. and Shrunk On.
Segment to be cut from a solid Ring, outside dia. = 18 1/2", section 13/16" x 13/16"
Ring to be turned to 18 3/4" outside dia., then 1/4" cut out, shaped to suit segment, and compressed as shown.

Piston and Piston Rod Pennsylvania Class "L" Locomotive—18½-in. Cylinders.

Plant of the Rocky Hill Stone Storage Company.

The Rocky Hill Stone Storage Co., of 50 Broadway, New York City, built a model plant for the manufacture of crushed trap rock for ballast, road making and concrete, together with paving and dimension stones and rubble. The quarry is situated at Rocky Hill, N. J., on the Rocky Hill branch of the Pennsylvania Railroad, 41 miles from New York and 49 from Philadelphia. The Delaware and Raritan Canal also is within 50 ft. of the plant.

In laying out the plant ample room was left for storage purposes, and the supply of different varieties of stone is always greater than the demand. This being the case the company conducts its business chiefly on the storage warrant plan. The warrants are like those used in the pig iron trade and are practically warehouse receipts which can be used as collateral at banks. By this plan a contractor being awarded a piece of work can make arrangements to have all the stone ready in advance, to be delivered to him upon presentation of the warrants duly signed with shipping directions appended. The goods will be allowed to remain on the company's property for a certain number of months, and if not called for within a specified time a moderate storage charge will be made.

The quality of stone quarried at Rock Hill is shown by the following abstract of a report of compressive resistance tests made by Prof. William H. Burr at the testing laboratory of Columbia College, New York City:

Quarry.	Size of cubes.	Ultimate compressive resistance in pounds per square inch, at First crack.	Failure.	Remarks.
Quarry No. 1.	2 in.	29 484	31,887	
	2 "	1b 673	* 23,096	
	2 "	11,595	† 16,469	
Average	.....	19,921	23,811	*Apparently compressed parallel to bed. †Compressed parallel to bed.
Quarry No. 2.	2 in.	30,542	33 768	
	1½ "	27 753	32 379	Apparently compressed parallel to bed.
	1¼ "	17,788	29,067	
Average	.....	25,357	31,738	
Quarry No. 3.	2 in.	33,580	35,136	
	2 "	21,921	26,305	
	2 "	2 ,113	32,088	Apparently compressed parallel to bed.
Average	.....	:5,871	31,176	
Quarry No. 4.	1½ in.	37,330	39.823	
	1½ "	35 467	41,422	Seamed.
	1½ "	35,378	35,778	
Average	.....	30,078	39,007	

The following cubes, two 2) inches in size, were not broken, although subjected to the crushing weight mentioned below. When said cubes were afterward reduced to cubes of 1½ inches, they were broken with the results given above at No. 4 test.

No. 4.	2 in.	not broken at	37,750	lbs.
	2 "	"	"	
	2 "	"	"	
	2 "	"	"	
No. 2.	2 "	"	"	

The process of preparation of cubes rendered it impossible to distinguish by appearance of the surfaces the natural beds of the stone; hence, some of the cubes were apparently compressed on edge, and not on their beds, as they should have been.

The erection of the plant is the result of study extending over a period of six or eight years, and many new and original ideas were involved in the building and others are employed in operating. Some of these are shown in the accompanying engravings. Fig. 1 shows

the floor plan of the entire plant, excepting the screen house, which can be better illustrated by Fig. 2.

Adjoining the crusher house is the engine room, containingone Reynolds-Corliss type of engine manufactured by the E. P. Allis Co., of Milwaukee, Wis. It has cylinders 20 in. × 40 in. with a nominal horse power of 250. It is also capable of being run up to 380 H. P. The fly-wheel is 16 ft. in diameter with a 25-in. face and weighs 18,000 lbs. Next to the engine room is the boiler house containing three horizontal boilers 66 in. in diameter and 17 ft. long, with a working pressure of 120 lbs. These boilers are set in one battery and are arranged so that they can work independently of one another. In one corner of the boiler house is located the smoke stack, which has 20 ft. of solid masonry and above this 80 ft. of pipe, 52 in. in diameter.

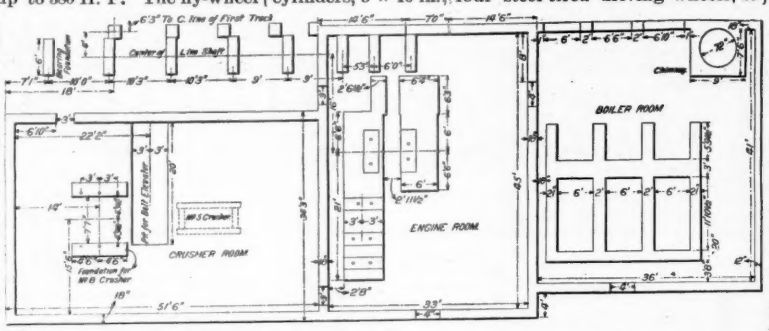


Fig. 1.—Floor Plan of Crusher House, Engine and Boiler Rooms.

Side views of the crusher and screen houses are shown in Fig. 2. The stone is brought from the quarries 250 to 300 ft. distant, on an industrial railroad and dumped into the mill of crusher No. 8, the rim of which is flush with the first floor. The material, after being crushed, is carried by the elevating belt up to the top of the screen house, dumped into the hopper *B* and carried by spouts to the screens *C C*. These screens are made to sort three sizes of stone, which, after passing through the screens fall into the bins *D D D*. What is too large for the screens falls into the hoppers *E E*, is spouted into the reject belt conveyor and carried to the box *F*, from which it is taken by the reject spout to crusher No. 5, which stands behind No. 8, as seen in Fig 2. After being re-crushed the stone again takes the course first described and is re-screened. Under the bins *D D D* are the tracks of the industrial railroad by which the crushed stone is carried 50 ft. to canal boats and loaded for shipment by water. The material can also be loaded directly into cars from the bins *G G G* for shipment by the Pennsylvania Railroad. The three standard gage tracks are about 1,500 ft. each in length. The tracks are so arranged in grade that cars drop down by gravity for loading and drop out again into one main siding ready to be drilled into a train. The two sets of bins are connected by spouts, as shown, making it possible to load the industrial and standard gage cars (one on every track) either separately or simultaneously.

The elevator used for conveying the stone from the crushers to the screens consists of 137 steel buckets mounted on heavy Boston Belting Co.'s rubber belting and have a carrying capacity of 135 lbs. each. The elevator travels at the rate of 200 ft. a minute. The screens into which the crushed stone is dumped are 16 ft. long, 40 in. in diameter and contain 346 sq. ft. of screening surface.

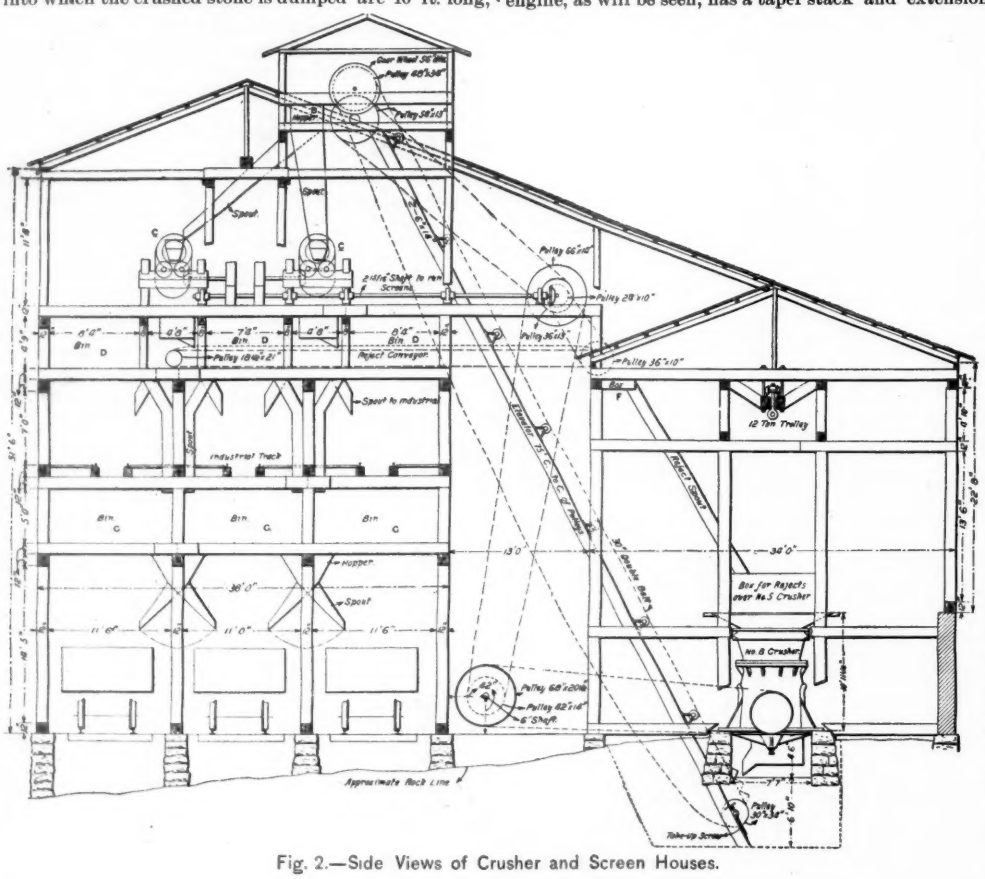


Fig. 2.—Side Views of Crusher and Screen Houses.

The locomotive and cars used on the 3-ft. gage or industrial railroad were designed especially for this plant the former by H. K. Porter & Co., Pittsburgh, Pa., and he latter by Mr. Culver, General Manager of the Rocky Hill Stone Storage Co. The locomotive (see Fig. 3) is particularly interesting from the fact that the water tank is built under the cab, extending across the back end of the engine. This arrangement does away with a saddle tank, which on an engine of this kind is clumsy in appearance. It also helps to better balance the engine. The capacity of the tank is 125 gallons The principal dimensions of the engine are: Gage, 36 in.; cylinders, 5 × 10 in.; four steel-tired driving wheels, 23 in. diameter; wheel base, 4 ft.; total weight in running order, 9,000 lbs.; length over bumpers, 10 ft.; extreme height above rail, 7 ft. 6 in.; boiler (homogeneous cast steel), 23 in. diameter. The guides, cross-heads, links, main and parallel rods are of steel. The engine is equalized across the rear ends of rear spring hangers; water is supplied to the boiler by two No. 2 Monitor injectors; the cylinders are oiled by a Detroit double sight feed lubricator and all fittings are as complete as found in large locomotives. The engine is fitted with a steam brake, and there is also a special form of coupler on the front bumper, designed by H. K. Porter & Co., to work from the cab by means of a hand rod.

The work required of this locomotive is that it shall develop a tractive force of 1,245 lbs., with a boiler pressure of 140 lbs. per square inch, and be capable of hauling a maximum train load of 45 tons on a 1 per cent. grade, and to be capable of working around 20-ft. curves. The engine, as will be seen, has a taper stack and extension front containing spark arrester and steel wire netting. The steam dome is inside the cab.

Fig. 4 shows the end elevation and principal dimensions and Fig. 5 a side elevation of the patent automatic dump car. The car is hung on two four-wheel swing trucks and is so constructed that it can be loaded without at any time reaching a maximum lift of 3 ft. Each car has a carrying capacity of 6,000 lbs. The car is dumped automatically by a tripper *A*, Fig. 4, coming in contact with obstructions placed on the track at required points, and is so weighted that after dumping it will regain its equilibrium and lock at both ends, as shown by *B*, Fig. 4. The car has but one side, which allows the material to slide out freely when the car is tipped. On the forward end of each set of three trailers is an automatic coupling similar to the one referred to in the foregoing description of the locomotive, which enables the train to couple with the cars automatically. The cars were built by the Carlisle Manufacturing Co., of Carlisle, Pa.

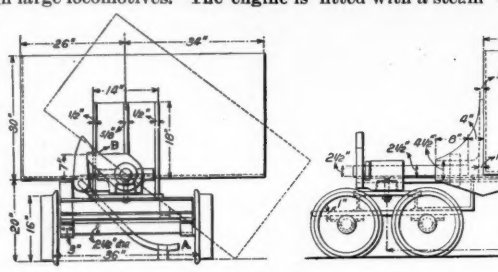


Fig. 4.—End Elevation of Dump Car.

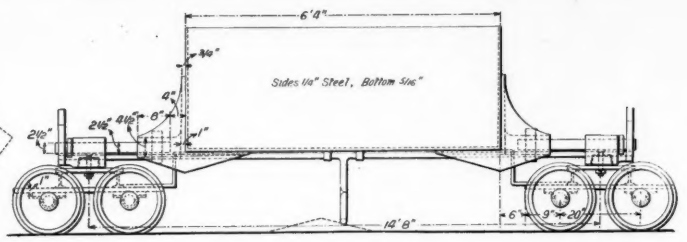


Fig. 5.—Side View of Dump Car.

The plant is equipped with two crushers, made by the Gates Iron Works, of Chicago, one No. 5 and one No. 8, the latter being illustrated herewith. This machine was specially designed for crushing the hard material to be quarried at Rocky Hill. The crusher is 13 ft. high and weighs over 90,000 lbs. Material to be broken is fed into the crusher through three openings at the top 18 × 42 in. each. The large hopper at the top, into which the stone is dumped from the quarry cars, is 132 in. in diameter. The plant being designed to turn out crushed stone on the gradual reduction system, between 600 and 1,000 tons of stone will pass through the larger crusher each day.

The main shaft, of forged steel, is supported on the iron octagon step *A*, and held in position in the center of the shell at the top, as shown. In this shaft, grooves or key-ways are cut corresponding to the space between the soft iron strips of the iron breaking head *BB*. The spaces are then run up with zinc and the head securely fastened to the shaft by screw rings at the top, the head being shaped like a truncated cone. The shaft at this point tapers toward the top to correspond with the bore of the head. Between the head and the shell there are 12 iron liners *CC*, the spaces behind and between being filled with zinc. These liners can be punched out through holes drilled in the shell. The space between the lower ends of the liners and the head which regulates the size of the crushed stone can be made larger or smaller by turning the nut shown at the lower end of the shaft under the step *A*, which raises or lowers the main shaft. The shaft in crushing does not revolve, as is generally believed, as long as there is some material between the liners and breaking head; but instead, a gyrating motion is imparted by the eccentric box *D*, which is attached to the bevel wheel above, forming a long hub to the same. The outside of the eccentric box is turned to fit the bore of the bottom plate in which it revolves, and the inside is bored to fit the journal of the main shaft, but is bored eccentrically, throwing the shaft out of the center just enough to fracture or break the material being crushed. The main shaft is loosely fitted in the eccentric box, and will revolve with the bevel wheel and eccentric box as long as there is no stone between the liners and the breaking head, owing to the slight friction the eccentric box causes in revolving around the journal of the shaft. The resistance of material being crushed overcomes this friction. In actual service the head revolves very slowly in a direction contrary to that imparted by the eccentric movement.

It will be seen that the closest point of contact between the breaking head and liners is always at that part of the head which is exactly opposite the thickest part of the eccentric box, and that as the eccentric box is revolved around the shaft, the point of contact is constantly moving before the eccentric, so that when the eccentric box has made a full revolution around the shaft, the point of contact has moved forward to every point around the liners. The material is broken at the point at which the head and liners are in closest contact, and when the head has been moved to the point of contact opposite, the material drops down a little to be broken again when the head has made a complete revolution. When broken small enough it drops down on the inclined diaphragm and slides out through the opening in the base of the shell at the left, as shown. Material is fed to the crusher through three openings in the top. The eccentric box is babbitted on both the inside and outside of the thickest part, and can be readily rebabbitted should it become necessary through loss of motion.

Other types of crushers, such as the jaw type, have a safety toggle which breaks, when the machine is overstrained or becomes clogged by some foreign substance. In the Gates type of crusher, there is attached to the band wheel *E*, which is loosely fitted onto the shaft, a special hub known as a break-pin hub, which is also keyed fast to the shaft. In this hub there is a hole through which is passed a break-pin, running through to a hole in the hub of the band wheel. This break-pin is held in position by clamp screws and is of sufficient strength only to stand the strain necessary to break the material being acted upon and should the crusher become clogged the extra strain,

would snap the break-pin, and the band wheel would revolve on the shaft, thus stopping the machine.

The whole plant has been laid out with a view to doubling the present calculated output in the near future without disarrangement of any of the present plant and with no stoppage of machinery except the time necessary to couple up. All of the buildings were built of stone from the company's quarries.

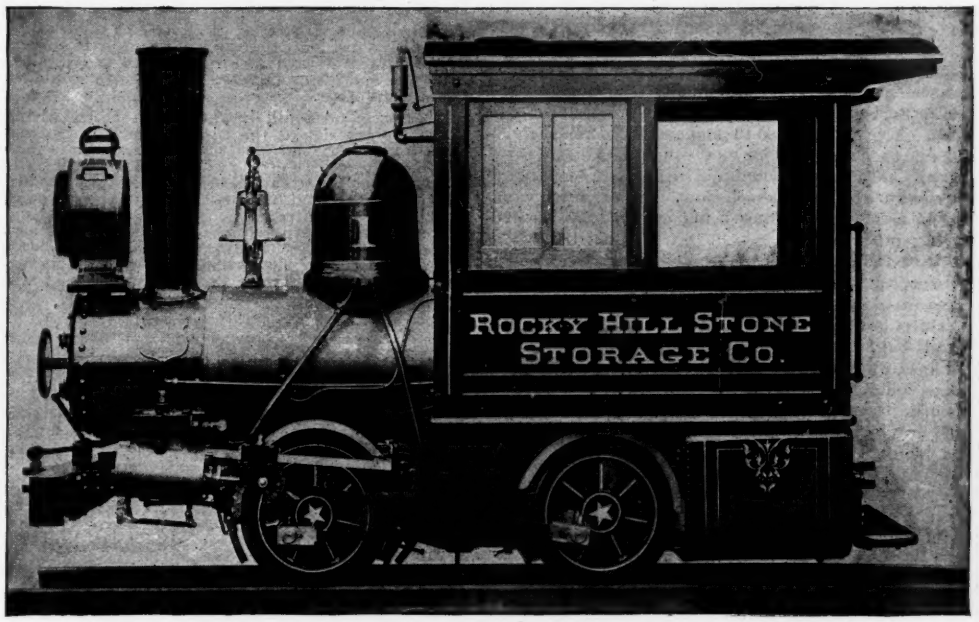


Fig 3.

The property now owned by this company contains in all about 250 acres, and was originally acquired by Mr. Martin A. Howell, of New Brunswick, N. J., who for some years was a director of the United Railroads and Canal Companies of New Jersey, now a division of the Pennsylvania Railroad. During Mr. Howell's life the quarries were leased to various tenants, the principal ones being Messrs. B. M. & J. Shanley, of Newark, N. J., and Messrs. Barbour & Ireland, of Philadelphia. After Mr. Howell's decease and the leases of the various quarries had expired, the heirs of the property, in connection with some of their friends, formed the present company with a view to thoroughly developing the resources which it contains.

The officers of the Rocky Hill Stone Storage Co. are: President, Frederic De Coppet, and General Manager, Frederic F. Culver.

Annual Report of the Interstate Commerce Commission.

The ninth annual report of the Interstate Commerce Commission has been transmitted to Congress. It is largely given up to the defects in the law and amendments necessary to carry out its purposes. The defects are reported to result chiefly from the interpretation of the law by the courts. Some provisions have been so construed as to cause delay amounting to denial of remedies by reason of the Commission's orders not being enforced with promptness.

The amendments proposed are practically the same proposed to previous Congresses, but which have failed of enactment. The leading amendment is that in relation to procedure before the commission, which it asks may be so amended that on application to the courts to enforce the commission's order the same question shall be tried, and on the same record which was tried before the commission, and under which the courts must enforce the commission's order unless error is found and injustice done. Another amendment is asked which shall give the commission, when it tries a question and finds what is being done is wrong, the the power to prescribe what, in its opinion, is right. It also asks that carriers which are corporations and subject to the law shall be indcitable and punishable by fine for infractions of law; that uniform classification be provided for; that the law be so changed as to secure the interchange of business between connecting railroads and a continuous carriage of freights from the place of shipment to place of destination.

A short history is given of traffic association agreements among the railroads, in which reference is made to the new Joint Traffic Association agreement, which was not yet ratified at the time the report was written. It appears that two of these association arrangements have been considered unlawful, and the commission has, under the statute, requested the district attorneys of the proper districts to institute necessary legal proceedings against them.

What is said about pooling is much the same as last year's report. Practically it is said that if Congress shall determine to authorize and legalize pooling it should provide necessary safeguards to prevent the abuse of the privilege. What would be necessary safeguards is evidently a question upon which the members of the commission are not entirely agreed.

The statistical work of the commission is treated at some length, and legislation is asked to secure necessary reports more promptly and to provide a uniform method of keeping railroad accounts. Some additional legislation is asked for in respect to the making of schedules of rates and joint tariffs—what shall be their form and what they shall contain. Ticket brokerage is again condemned. In respect to the safety appliance law it is suggested that the position of handholds be located and should be uniform, also that the standard height of drawbar, as determined upon, might be now fixed by law.

The Simplon Tunnel.

In our issue of Nov. 3, 1893, appeared a synopsis of the agreemnent entered into for building the Simplon Tunnel. This agreement was made by the Jura-Simplon Railroad Co., on one hand, and the houses of Brandt, Brandau & Co., Hamburg; Locher & Co., Zurich, and Sulzer & Brothers, of Winterthur and the Bank of Winterthur on the other. These houses entered into a contract with the Jura-Simplon Railroad Co. to construct the tunnel, as the Simplon Tunnel Construction Co., and have undertaken to complete the tunnel all ready for working in 5½ years from the beginning of the work. We gave at that time the financial estimate of the undertaking. A year or more later, that is, Dec. 28, 1894, we published a very careful description of the work in its engineering aspects, together with a map, profiles and cross-sections. We will recapitulate here a few facts contained in the latter article.

The tunnel will be about 12¼ miles long, making it much the longest tunnel in the world. The one next in length is the Gothard, which is 49,148 feet. It will leave Swiss territory near the village of Brieg on the river Rhone. It will run from northwest to southeast and open out on Italian soil on the bank of the River Diveria, a little below the village of Iselle and about sixteen miles from Domodossola, the present terminus of the Italian railroads. The tunnel will have comparatively light grades. From the Northern end to the summit, the grade will be 0.2⅝ per cent. The southern half will have a grade of 0.7 per cent. The northern portal is 174 feet higher than the southern. The elevation of the tunnel summit will be 2,312 feet above the sea, and the maximum thickness of the overlying rock will be 7,006 feet. The elevation of the Mont Cenis tunnel is 4,162 feet, and the greatest thickness of overlying rock is 5,425 feet. The elevation of the Gothard tunnel is about the same as the Mont Cenis and the greatest thickness of rock above it is 5,186 feet. It will be seen, therefore, that a much higher temperature will be found in the Simplon tunnel than in any of the others. It is expected that the maximum temperature of the Simplon tunnel will be 104° Fahr. The maximum of the Gothard is 87½°.

The other Alpine tunnels have two tracks; the Simplon tunnel will have but one, but a second tunnel will be built if required. A gallery will be constructed on the line of this second tunnel for convenience during the construction of the first, and for ventilation. The contracting company will build the first tunnel complete, track and all, also the longitudinal gallery and the second tunnel if it is built. The contracting company will deliver this second tunnel with ballast, but will not put in the track. This second tunnel will be built for an agreed price if the railroad company decides within four years after the beginning of the work to call for it The contracting company will build the single-track tunnel and the parallel gallery for the gross sum of 58,825,000 francs. In case the second tunnel is required, it will be completed, without the track, as we have said, for a further sum of 16,220,000 francs, making the total a little over 75,000,000 francs.

All of this information now has a special interest, as the recent convention at Berne, of which we have lately given a few particulars, appears to have reached results which make it reasonably probable that the work will soon be undertaken. This convention was attended by representatives of the Swiss and Italian Governments and of the companies concerned. Switzerland had already been committed to the construction of the tunnel, but the Italian Government had not entered into any definite agreement. The upshot of the Berne convention is, that the Italian Government has made an agreement with the railroad company to work the line from the mouth of the tunnel to a connection with the Italian system of railroads, it to pay 3,000 francs a kilometer toward the cost of building that part of the tunnel which is on Italian soil, namely, 7,230 meters; to obtain from the cities and provinces of Upper Italy a subvention of 4,000,000 francs; moreover, the Italian Government will pay an annual subsidy of 66,000 francs for 99 years. Finally, it will build the connecting line from Iselle to Domodosolla. The Italian cities and provinces interested are Milan, Genoa and Turin.

Switzerland makes a national subvention of 4,500,000 francs, and the cantons interested will give 10,500,000 more, but the agreement with the Swiss cantons and cities for the 10,500,000 francs has lapsed and must be renewed. The total subvention is therefore about 20,000,000 francs, leaving some 40,000,000 to be financed by the railroad company. Some of the technical newspapers of the continent think that this will be a pretty hard job, especially in view of the fact that the Swiss Federal Government has recently been very exacting, and has thus discouraged the investment of capital in railroad interprises.

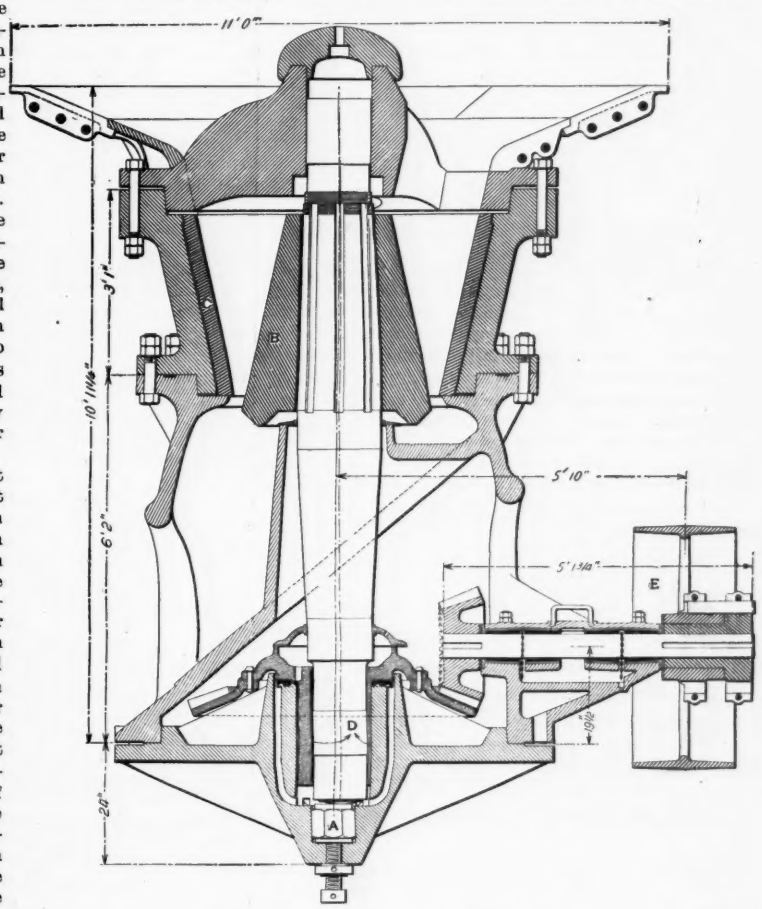


Fig. 6.—Sectional View of Crusher No. 8.

Compressed Air at Seventy-seven Pounds Per Square Inch.

A French engineer, Mr. Hersent, has recently made experiments to ascertain the effect upon the human organism of compressed air at great pressures. In recounting these experiments the *Revue Technique* says:

"Since the engineers of the French Compagnie de l'Est employed in 1859 for the first time compressed air

to sink the caissons of the Rhine bridge at Kehl to a depth of 72 ft. below mean water level, greater depths have been reached several times, the greatest, apparently, being 115 ft. at Cubzac, in France. The proposed bridge across the channel between France and England requires, however, depths of foundation ranging all the way down to 164 ft. below mean tide."

As a matter of fact greater depths than 115 ft. have been reached by pneumatic caissons. The deepest foundation of the Memphis bridge is 130.8 ft. below high water and the deepest foundation of the Eads bridge at St. Louis is 135.5 ft. These were both sunk by pneumatic caissons. The greatest immersion during work was 108 ft. at Memphis and 109.7. at St. Louis. It may be that the French example of 115 ft. refers to the depth below water at which the men actually worked.

The French engineer Hersent has conducted a series of experiments on land, with a view of finding the effects of pressures up to 77 lbs. per square inch on the human system and of establishing a code of rules for the change to and from said pressure of nearly 5.5 atm. from and to ordinary atmospheric pressure.

His researches were based on the idea, that the evil effects seemingly resulting from work in compressed air, were really due to the too rapid change from high to normal pressure, and to the refrigeration resulting thereupon. He considered as all-important an almost insensible change of the state of condensation of the gases dissolved in the organism and the maintaining of an even temperature.

Before experimenting on men he used dogs and found them to be able to withstand a pressure of 5.5 atm. for 5 hours in succession without injurious effects, if the locking-in was extended over 25 minutes and the locking-out over an hour and a half, and if the temperature was kept around 68 deg. Fahr.

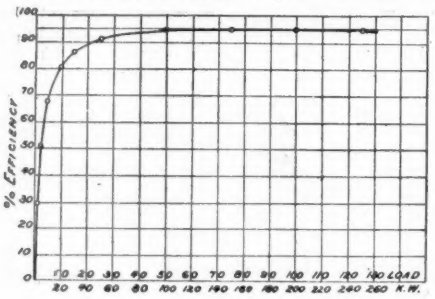
Having thus fortified his position, Hersent proceeded to submit professionals, of experience in compressed air working, to the same experiments. Besides thermometers and manometers his compression chamber was equipped with a telephone and glass lenses in the walls. Starting with 2 atm. the pressure was increased $\frac{5}{10}$ of an atmosphere every day up to 5.4 atm. At this pressure one hour was consumed in locking in, the sojourn in the chamber lasted one hour, and three hours were consumed in locking-out. The only evil effects were a slight efflorescence of the skin upon leaving the caisson, which, however, disappeared after a sulphur bath, and a passing dizziness.

Men of sound organism are in no wise affected by working under pressure, if proper precautions are used For four hours' work in the caisson four hours lost time must be permitted for locking (one in and three out); the access tubes of the caisson must be equipped with elevators to save the laborer the final fatigue of climbing 164 ft. on ladders; a sulphur bath should be taken every time the man leaves the caisson.

If these precautions are enforced, and the air cocks are placed out of reach of the men in the lock, Hersent does not see why a depth of foundation of 164 ft. should not be reached with compressed air.

Improvements in Engine and Dynamo Building.

The J. H. McEwen Manufacturing Co., of New York, builders of automatic engines, is now building dynamo electric machinery in connection with other work. The high-speed engines made by the company have been on the market for about four years, and now that it is building engines and dynamos together, the desirable features of standardization of all parts and complete adaptability of each machine to the other are secured. The company has recently improved its engine governor and now guarantees that the engine shall not run one revolution slower when fully loaded than when



Efficiency Curve of Thompson-Ryan Dynamo.

running empty. Any reduction of boiler pressure from the greatest to that necessary to do the work will not reduce the speed of the engine one revolution. The company has also somewhat improved the design of its engine crosshead. The crosshead shoes are held in position by eccentric bolts, making it easy to adjust the position of the shoes for wear. The shoes swivel on the eccentric bolts, insuring a full bearing.

The dynamo which this company is making is known as the Thompson-Ryan. Its most important feature is a set of series windings surrounding the armature, which are called balancing coils. This feature is the invention of Professor Harris J. Ryan, of Cornell University, and was introduced for the purpose of balancing armature reaction. Tests have been made which show that it accomplishes the desired end. The suggestion that the addition of balancing coils in a dynamo would complicate its construction is thought by the makers to be fully offset by the simplification of the machine in other respects. The field castings are steel, consisting of but three pieces bolted together. One of these castings is the pole-ring, shown in Fig. 1, through which the balancing coils are wound. The other two castings constitute the field-ring proper, Fig. 3.

Fig. 2 is a view of the completed pole-ring. The field-ring, Fig. 3, shows on its internal periphery the pole necks around which the coils are placed. The field-ring is of such a shape as to entirely enclose the field coils, protecting them. The space in the field ring allowed for the field-coils is small, since less than one-quarter as much energy is required to magnetize the fields of this dynamo as is necessary for most other machines of equal capacity. This small amount of field energy makes the temperature of the field-coils low. No compound winding is used, compounding being afforded by the balancing coils.

All of the armatures of whatever capacity, whether wire or bar wound, are of the same general style. The cores are built of thin plates of a steel having a low hysteresis loss. The plates are stamped out in the form of rings, which are afterward clamped together to a central hub by means of brass end plates. No iron comes in contact with them, which insures prevention against leakage of magnetism and development of potential in the core, to cause eddy currents. The holes in the plates serve to receive the armature windings. Fig. 4 shows the armature core finished.

A peculiarity of this machine is the large number of poles used. Although this feature would usually be bad in ordinary practice, in this particular design it enables the builders to greatly shorten their armature conductors and to use on all their armatures what may be called the cylindro-hexagonal style of drum winding. in which all parts of every conductor of any one layer on the armature lie in the same cylindrical surface, and the windings do not bend down over the end of the armature core at any point. As the conductors are placed through the core and below the surface no binding wire is necessary. The armatures are, as a rule, large in diameter and comparatively short in length. They are not mounted on the shaft, as is the usual practice, but are carried by a projecting ring of the spider. Fig. 5 shows the completed armature on a 200 kw. direct connected railroad generator. An important feature of these armatures is the ventilation; being large in diameter with a large central opening extending through them, a large heat radiating surface is afforded. The crossing of the conductors affords also a sort of open work, allowing air circulation. Fig. 6 is a view of the complete brush holder arrangement. The brush holders project outward and leave the entire end of the commutator free and accessible. The makers claim that these brush holders, on account of their simplicity, require no adjustment, and, with brush holders absolutely fixed, claim entire freedom from sparking under any and all conditions of load. The whole brush holder arrangement is adjustable around the commutator, and by loosening the clamp bolts the brushes may be shifted backward or forward to adjust the compounding of the machine. In this way the machine may be adjusted through a range of from 10 per cent. drop at full load to 10 per cent. rise without any effect on the commutation.

Fig. 7 shows a curve of commercial efficiency taken from a test of a Thompson-Ryan 200 kw. railroad generator. It shows good efficiency under heavy loads and very high efficiency under light loads, with a great range of uniform efficiency. This the makers say is due to the unusually small fixed losses, the result of very small field energy consumed and the light core losses.

The design of this machine adapts it well for working two or more in parallel. If thrown in parallel, though differing widely in voltage produced, each machine will take its due proportion of the load, although it may be greatly over compounded. These dynamos are built in sizes from 12½ kw. to 1,500 kw., to be used either belted or direct connected.

The Fire in the Bozeman Tunnel.

The great fire in the Bozeman tunnel, on the Northern Pacific Railroad, seems at last to have burned itself out after raging for three months. A few weeks since it was reported to have died down or to have been extinguished, but it is only within a comparatively few days that it has been possible to enter the tunnel, and even at the present writing it is still steaming and smoking and the heat is so intolerable that workmen can remain in it but a short time.

The Bozeman tunnel, sometimes called the Muir tunnel, from the town of that name, situated at its eastern entrance, as Bozeman is at the western extremity, extends through a portion of the Bridger range of mountains and is the second longest tunnel in the state, the longest being the Mullan tunnel, on the same railroad. The Bozeman tunnel is nearly a mile long. Instead of being lined with masonry, as was the Mullan tunnel, it was simply timbered on the inside, hence the terrible ruin wrought by a three months' fire may be imagined.

How the fire originated will always remain a mystery. It was first discovered at 4 o'clock on the morning of Sept. 13. Arrangements were immediately made for the temporary transfer of passengers over the top of the divide by means of wagons. Progress at this rate was necessarily slow, requiring an hour at best to cross the divide. Orders were given for the tunnel to be sealed at both ends, and it was expected that the fire would soon die for want of air.

This was of no avail, however. At the end of three weeks the interior of the tunnel was like a furnace. Notwithstanding the fact that the fire was situated almost at the center of the tunnel, and the smoke had nearly half a mile to travel each way before escaping at the ends, dense columns of smoke were constantly rising, marking the two entrances of the tunnel.

Every device known to men accustomed by long experience to battling with fires was brought into action, but with no effect. Two weeks were spent in trying to extinguish the flames with water. Hundreds of water tanks, oil tanks and cars were filled with water and run up to the mouth of the tunnel; hundreds of feet of hose were attached and pressure secured by forcing air into the tanks, thus pouring the water upon the flames. But this was slow work, as what was gained by one trainload of water was lost while another was being switched into position. The suppy of water also being inadequate, it was impossible to accomplish permanent good. Such clouds of smoke were constantly pouring from both ends of the tunnel that the pipemen who were sent in to fight the flames were obliged to fasten small ropes around their waists. Men outside held to the other ends, and the firemen jerked on the ropes every few seconds to assure those at the other end of the line that they had not been overcome by the smoke. Hosemen were compelled to crawl on all fours, with sponges and cloths fastened to their noses, to keep from inhaling the smoke. They would soon be overcome, however, by the smoke and gases, which was made known by the suspension of the jerking of the safety lune, when they were immediately drawn out where the fresh air would revive them.

But the flames only burned hotter and hotter, until at lest the Northern Pacific officials were compelled to acknowledge that even a railroad company had been defeated. The flames were entirely beyond their control, and it was seen that they would have to be allowed to burn until everything was consumed. Accordingly, the tunnel was ordered sealed up for the second time, and the flames were left to take their course. By this time a track over the mountain, which had first been put in condition for the conveyance of freight, was adopted for the transfer of passengers, and this is in use at the present time, the train being taken over the hill in one section with three hog engines—two pullers and one pusher.

The full extent of the damage cannot yet be estimated. It is probable that the tunnel will be lined with brick, but it is evident that there will be many months' work involved, and it is safe to predict that at least a year will elapse before the tunnel can again be used for the passage of trains.—*Sioux City Times.*

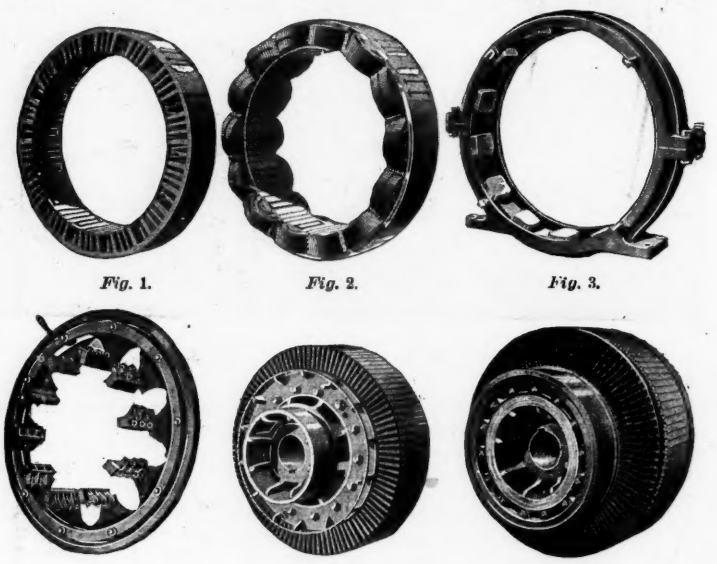


Fig. 1. *Fig. 2.* *Fig. 3.*

Fig. 6. *Fig. 4.* *Fig. 5.*

Details of Parts—Thompson-Ryan Dynamo.

Crown Stays.

The Superintendent of Motive Power of one of the large Western railroads, speaking recently on the subject of the tightness of crown stays, described the practice of his road, and at the same time showed how crown stays were put in by a locomotive works which had done some work for his road.

Fig. 1 shows a stay through the crown sheet screwed in as tightly as possible. In cutting the threads on the stay it is not possible to cut them all the way up to the head, hence in screwing it home the head will not bear against the steel enough to make a tight joint, and leaks will almost surely occur. Figs. 2 and 3 show the methods of making this joint tight. In Fig. 2 a small groove is turned on the stay just below the head. This will permit the head of the stay to be screwed up tight against the sheet, but it has the disadvantage of weakening the stay. Fig. 3 shows the stay with a washer placed under the head. When this was first tried copper washers were employed; but this metal has been abandoned unless the road ordering the locomotive specifies copper wash-

ers. The reason for discontinuing the use of copper washers is that they do not last. Either a galvanic action takes place which destroys the washer or they do not stand the heat. In the place of copper charcoal iron has been substituted, and it is the present practice of the builders to use this style of washer on their latest engines.

The stay shown in Fig. 4 is the one used by the railroad company in building new boilers or repairing old ones. A small fillet is formed on the stay, and the edge of the hole in the sheet is rounded. This permits screwing the stay home tightly, and gives an extra bearing surface.

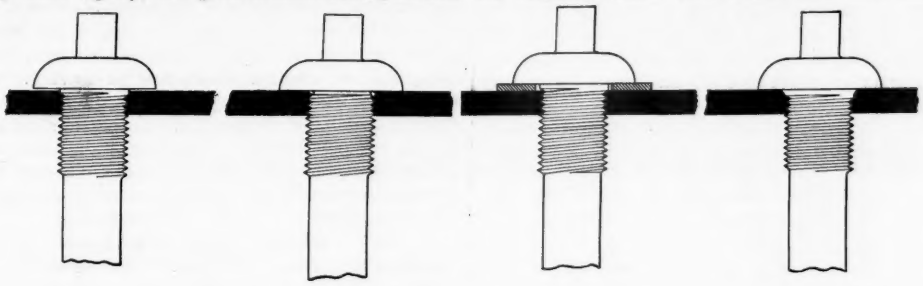


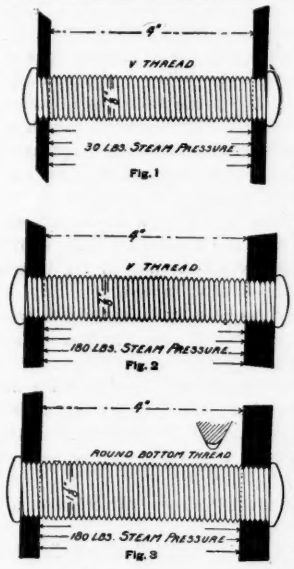
Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Crown Stays.

This has been found to give excellent results, and appears to be a better design than that with the washer, because there is only one joint to leak instead of two, one on each side of the washer. The question as to whether or no the washers will be perfectly flat after punching also comes in and tends to further strengthen the opinion that Fig. 4 is the best design to prevent leaks.

Staybolts.

At the November meeting of the Western Railway Club, in the discussion on Wide Fireboxes, Mr. D. L. Barnes spoke incidentally on staybolt practice. He said: "There is nothing that will lead to so many broken staybolts as dull dies and tight fits. Dull dies indent the iron and act like a 'jam' die of the kind that is often used to cut threads on small wires. A staybolt cut with a sharp-edged die will bend without breaking a good many more times than one cut with a dull or 'jam' die. If there is a tight fit in the sheet the hard steel of the plate will indent the soft iron bolt and injure it so that it will not stand as much bending as one that is fitted less tightly. I have never heard of a loose staybolt breaking. A small degree of looseness permits the bolt to work a little in the sheet, and thus reduces the bending action and increases the life of the bolt in the same way that a ball joint will.



"The condition of staybolt practice, which has been the outcome of neglect to keep the bolts in proportion to the work they have to do with increased steam pressures, is perhaps illustrated by the diagrams.

"Fig. 1 shows probably the first arrangement of staybolts that was generally used. The sheets were about ¼ in. thick. The pressure was 30 lbs. and the staybolts varied from ⅞ to 1⅛ in. in diameter. Such bolts were used very largely on steamboat boilers and breakages were very rare. The sheets were thin, and the buckling of the sheets prevented a concentration of the bending of the staybolt at the inner edge of sheet.

"Fig. 2 shows how the sheets have been increased to ½ in., and in some cases ⅝, and the steam pressure increased to 180 lbs. or more without any increase in the diameter of the bolt. Furthermore, the sheets are now made of hard steel instead of soft wrought iron, and the longer fit in the sheet through which the staybolt must be forced, in putting it in, has a detrimental action on the surface of the bolt at the bottom of the thread.

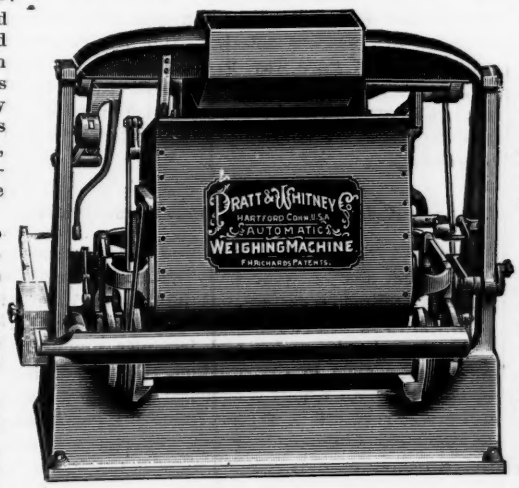
"Fig. 3 shows what would be a better practice if one is to judge from the tests that have been made with rods that have had threads cut under different conditions. There is no reason why a staybolt should fit in the sheet at the bottom of the thread on the bolt, as the necessary tightness can be obtained from the fit on the top of thread, and it would seem better to leave a small space, as shown, between the top of the thread in the sheet and the bottom of the thread on the bolt. This can be done by a proper shape of thread on the taps for the sheets. A round thread at the bottom would seem to be better than a sharp one. A good many roads are using larger staybolts, and it is a fact of much interest that the increase in size above ⅞ of an inch has been followed by a decrease in the number of breakages. As steel is more liable to fracture from an indentation at the point where the bending action is concentrated, it is not to be expected that steel staybolts will stand so well as iron. I have no doubt, however, that if a steel staybolt is properly put in and made of a proper size, it will stand just as well as an iron one.

Weighing Coal Automatically.

The Pratt & Whitney Company, of Hartford, Conn who have for some time past been making a well-known automatic weighing machine generally used for weighing grain, corn, sugar, etc., have decided to adapt this machine for the purpose of weighing the coal used on locomotives. In fact, a machine for this purpose is now nearly completed at the works of the company in Hartford. This machine embraces all the recent improvements made in the automatic weighing machine, and is thus not only lighter and simpler, but more positive in its action than was the old form. This new device will automatically weigh and register the amount of coal taken in the yards, accomplishing this result with rapidity and accuracy. The machine which is shown in the accompanying, engraving in its usual form, is so arranged that the material to be weighed is allowed to run into the hopper from above, continuing to run in until the hopper contains such weight of the material as is balanced by the weight to which the machine has been set. At exactly this weight the flow of the material into the hopper is momentarily checked and the bottom of the hopper opens, dumping the load, after which the hopper closes, the stream is again allowed to flow into it and the operation is repeated. The number of loads is automatically registered upon a scale or dial, so that the number of such loads of a given weight which has passed through the machine may be seen at a glance. The weighing part of the machine is supported by knife edges, and the whole is delicately and yet strongly made.

The machine is adjusted as follows: To see if the machine balances when empty, place the sliding weight, shown to the left of the engraving, on the graduated arm at the zero mark, then turn the eccentric lever down to the bottom hole. Observe if the pointer on the end of the graduated arm is directly opposite the corresponding mark on the beam. If the machine balances light, the two check weights, which are on the threaded arm at the right of machine, should be turned toward the center; if heavy, toward the outside until it comes to a balance, being careful that there is nothing in the bucket at the time.

After having tested the machine empty it is necessary to turn the eccentric lever back to the upper hole, and slide the weight along on the graduated arm to indicate the required amount of load to be weighed (not less than one-half the total capacity of the machine). If we then let the material flow into the machine, it will weigh, discharge and register the loads, automatically. To insure accurate weight, it is necessary at all times to feed sufficient material to the machine to fill the drip opening in the spout while the valve is in its drip, or partly closed position.



Pratt & Whitney Automatic Weighing Machine.

The machine may be tested while in operation also, by being allowed to perform all its operations except the dumping of the material being weighed. The machine should, when stopped by moving the small eccentric lever, show the same balance as when empty. If it does not, this can be regulated by moving the small poise weight provided for the purpose.

Wrecking in New Brunswick.

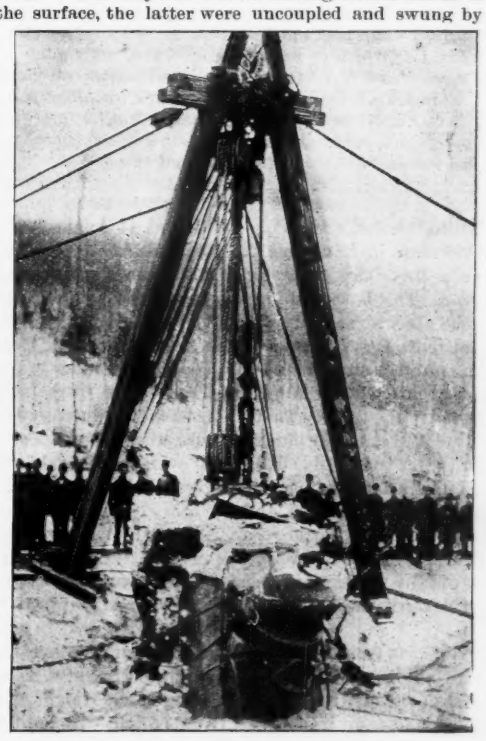
In our issue of Feb. 16, 1894, appeared an account of how a 90-ton locomotive and tender were raised out of 30 ft. of water, the engine having jumped the track and gone down a bank into a lake in New Brunswick.

We recently received a photograph, which is reproduced, showing the engine as it was brought to the surface, and the manner in which this was done. Large shears were erected and guyed to steel pin fastenings 3½ in. in diameter. These were set in lead in holes drilled in the rock on the side of a hill about 100 ft. above the track. Hitches were made of steel hooks 15 ft. long, which were lowered in sections linked together and fastened to the tender and to the crank-pins and smokestack base of the locomotive.

No diver was employed, which made the work of fastening the hitches very difficult. The work was designed and directed by Mr. Haggerty, then Mechanical Superintendent of the road on which the accident occurred.

In order to see how to conduct operations a mirror was lowered, so arranged that it could be moved from the top, and a powerful reflecting lamp held by some of the workmen. This made any object visible which was brought between the lamp and the mirror, and by this means the hitches were fastened as described.

Three locomotives were used to pull together on the falls. When they had drawn the engine and tender to the surface, the latter were uncoupled and swung by means of guys across and above the main tracks and lowered to a landing place at the base of the mountain.



Raising a Locomotive Through the Ice.

Great difficulty was experienced throughout the work on account of the extreme cold, the thermometer often registering 30 deg. below zero, and this accompanied by a wind blowing 50 miles an hour.

Foreign Railroad Notes.

Herapath's says that the Frenchmen are to build a railroad 19 miles long in Madagascar at once.

A "train de luxe" now runs from Ostend, Belgium, to Trieste, Austria, by way of Vienna, once a week. The train has dining cars as well as through sleeping cars, and passengers leaving London on Sunday arrive at Alexandria, Egypt, on the following Saturday.

An English paper says that the trains between London and Aberdeen, the schedules of which were shortened after the race last summer, do not make very good time. Every day in October the West Coast train arrived at Aberdeen at least 25 minutes late, and the East Coast is said to have averaged better than the West Coast. The schedules were figured at about 52 miles an hour, we believe. It is said that since November these have been lengthened, the West Coast 45 minutes.

Soap-suds on the Waves.

Some experiments have recently been made which show that soap-suds will reduce a sea almost as well as oil. This was first tried on the Scandia, an English steamer, in a storm on the Atlantic. Having no great quantity of oil, the master dissolved a large quantity of soap in water, which was discharged over the bow. The effect was nearly instantaneous, the height of the waves being so diminished that the vessel could be managed without difficulty. Captain Le Gall, of the French steamer Sénégal sailing the Adriatic was struck by a squall, and used soap and water with same result.

He used three kilograms of soap dissolved in 70 liters of water. The solution when dripped over the bow, made a quiet space about 10 meters wide, preventing the waves from breaking over the vessel.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

All of the 13 locomotive building companies in the United States, except one, built more locomotives in 1895 than in 1894, and the total number of engines built foots up 1,109, against 695 in the previous year. This is something of an increase, and a very good record so far as it goes, but that it does not represent a normal increase seems evident from the number of engines built in the five previous years, when never less than 2,000 locomotives were built in any one year. That this is a safe deduction the large orders for locomotives which have been placed in recent weeks give additional evidence. Two of the companies reporting locomotives built in 1895 did not build any in 1895, and one other company did not report in the latter year. The larger locomotive works seem to have been in a better position to profit by the large increase of orders and several of such works built more than twice their output in 1894.

Reports from the car building companies show that car building also has taken an upward turn, the output of the contracting shops being 31,893 freight cars. This is in comparison with 17,029 freight cars built in 1894. When we say that car building has taken an upward turn, we limit the phrase to a comparison with the previous year. The total of cars built this year is not a large record by any means, and makes the number built in the years immediately preceding (51,000 in 1893 and 93,000 in 1892) appear extraordinarily large. It seems probable that railroad managers have continued the use of much equipment, not in good condition, and which ordinarily would be replaced. In this fact lies the hope of the car builders.

The so-called "war scare" probably has no special significance for the railroads except in a few individual cases. Generally speaking the railroads will suffer severely from its effects, just as every other interest will—no more and no less. For a long time the weaker roads have not been able to get much money from abroad; while the strong roads which have in the past year made new loans in foreign markets are in no pressing need of money. Therefore, the annihilation of foreign credit does not affect the railroads especially. Those which have had that credit recently can get along without it for a while. It may be well to say right here that to talk of the prevailing panic as a war scare is misleading. No well-informed man on either side of the water expects war. It is a currency scare greatly intensified by an untimely act of our government. Investors *at home* as well as abroad are afraid that we shall be driven to a silver basis and some of them are hurrying to cover; and that is enough to upset the markets of two hemispheres. The talk about war would be ridiculous if it were not so wicked. A war between the United States and England would be a calamity to those two nations and to the whole civilized world so appalling that no sensible man is willing to think of it as possible. Unfortunately, the ignorant, the thoughtless and the unscrupulous are very noisy, and for the moment fill the public ear with their cries, but the voice of reason already begins to be heard. Meantime the damage to our credit has been done and the painful journey toward prosperity has been arrested, for how long no one can foresee. But to return to the railroads. It is quite possible that some of the great reorganizations now on hand will be seriously delayed. The chances for a fair market for new bond issues have been immensely diminished, and the power and the will of security holders to pay assessments have probably been diminished in equal degree. This strikes us as perhaps the only *special* feature of importance in the present situation in its relation to the railroads; but that they will, in common with the farmers and the manufacturers, suffer severely in income can hardly be doubted.

An audible block signal, according to the opinion of a superintendent who spoke in a recent discussion before the Buffalo Association of Railroad Superintendents, "is a good thing"; and, adopting the logic now prevalent in the slang of the street, it is every one's duty to "push it along"—to promote its adoption. But practical railroad men have hitherto pushed that class of signals *away* from them, with persistent unanimity, and it is therefore of considerable interest to know what kind of a device the Buffalo gentleman refers to. All of the audible signals that we have ever seen have been subject to the one great drawback, that the engineman's signal to proceed was the *absence* of a sound. As long as this is so the apparatus violates the principle, fundamental in block signaling, that any failure of men or of apparatus shall reveal itself by giving a stop signal, or at least reveal itself in some way. We have encouraged inventors of audible signals, as far as seemed prudent, and they have made many ingenious applications of electrical and mechanical principles, but we have yet to see a business-like and substantial application that conforms to correct principles. We do not believe it impossible to solve the problem in the right way, and that is the reason why we have encouraged the inventors. As the frequency of trains on busy lines increases, something other than the ordinary visual signal becomes not merely desirable, but a pressing necessity. This is sufficiently evidenced by the experience and the practice of railroads in and around London, whose elaborate and expensive arrangements for the use of audible signals during the prevalence of their incredibly black fogs are described in an account printed in another column of this issue. That account emphasizes a point not always fully appreciated, that the English method of torpedo signaling partially or wholly complies with the principle we have just mentioned, that the engineman must have some positive assurance that the road is clear, so that he shall not be compelled to run mile after mile haunted by a suspicion that possibly some signal set to stop him did not properly act, or that some signal actually given may have escaped his attention. When American inventors devise an automatic apparatus which shall satisfy the enginemen as well as the shouting fogman satisfies the English runners, they will have made a great advance on all the "patents" now before the railroad public. One trouble with an audible signal is that noise will diffuse itself about as it pleases, and the effort to devise a thoroughly safe signal to use in dark tunnels (after the Fourth avenue collision in 1891) led to a sudden shifting of the problem, and audible devices gave way to electric lights. The lights were never put up in the Fourth avenue tunnel, but an experimental plant was tried in the Weehawken tunnel. This was described in the *Railroad Gazette* of May 26, 1893.

American Railroad Securities in the London Market.

During the two years of our financial depression the London market practically ceased dealing in American railroad securities, but the last six months have shown a recovery from this condition which, although it has been slow and irregular, promises a permanent change in the situation. Confidence has by no means been wholly re-established, for the English investor is still a shy and reluctant purchaser, watching closely the conditions of exchange between the two countries, and responding quickly to the rumors as to the soundness of our currency. Whatever confidence we may have had on this side that we should ultimately have sound money, there can be no doubt that the English investor has believed us to be on the brink of a currency panic. An Englishman with a firm conviction of any sort is notably a difficult man to turn from the error of his ways, and it must be admitted that recently he has had good reason for questioning our railroad securities. Unfortunately English holdings of our securities have been largely in insolvent roads. They are immense holders in Atchison, Erie, Reading, Norfolk & Western, Northern Pacific, Union Pacific and a host of smaller roads that are now bankrupt. As a result of this the factor which, next to our currency prospects, has had the greatest direct influence on the London market has been the progress in reorganization of these properties.

The working of these influences, together with the effect of our returning prosperity, are distinctly shown in a brief summary of the operation of the London market for the year. During the first half of this year all dealings in Americans depended immediately and absolutely on the condition of exchange between New York and London. A change in the rate of exchange, with the merest possibility of gold exports from New York, meant an absolute cessation of purchasing. Up to the action of the bond syndicate on the 1st of February, American securities had no part at all in the English market. From the moment of the successful conclusion of this transaction the recovery began. For the following month the English public seemed to be waiting passively to see how the operation of the syndicate would turn out. The rush of applications for the issue of government bonds proved the restored confidence on the part of London financial houses in our soundness, and showed also the immense amount of capital then lying idle and waiting investment. But the general investor followed the lead of the bankers very slowly; and there were other unfavorable features during March and early April: the Canadian Pacific surprised every one by suspending its dividend at this time; the Atchison reorganization plan was announced, and called for very heavy assessments; our anthracite roads were engaged in one of their worst annual fights over distribution of product. But the improvement in railroad earnings and the promise of a large cotton crop began to have their legitimate effect during April.

Another stimulus to the market for Americans was the placing of large amounts of newly issued American securities in London by bankers connected with the syndicate. This began with a block of Southern Railway stocks and bonds which were sold by the house of Pierpont Morgan in the last half of April. This policy was followed during April and May by the syndicate until it was supposed that upward of $40,000,000 of new American securities were disposed of by these bankers in London. Large blocks of Manhattan Elevated, Chesapeake & Ohio, New York, Ontario & Western, and New York Central, were thus sold in April and the first half of May. The pressure of New York drafts against this mass of securities forced down the rate of exchange, and the syndicate took advantage of this turn after covering all the bills it had previously sold at high prices. At the same time the effect on the London market was rapid; they began to take hold of Americans again; at first the professional operators only, but by May 1 a genuine investment demand had sprung up, and imparted remarkable strength to the American market. There was a good deal of investment in the Grangers and the Vanderbilt lines, showing a movement not merely on the part of the bigger operators, but of the conservative investors.

By the middle of May the activity in Americans was very great, and stocks and bonds were dealt in which had rarely been seen in London at any previous time. This was the high-water mark in Americans for the year, but it was of only short duration, for its causes were partly artifical, and due to the operations of the syndicate above described. It showed clearly enough the mass of idle capital in London, and the readiness with which it could be turned in one direction or another.

When these artificial tonics applied to the London market had worked out their effect, the rate of exchange stiffened, and the American market grew rapidly duller and confined to professional operators. Soon most of the professionals abandoned it for other fields. This decline was due to a number of immediate causes. The Erie foreclosure order had a depressing effect in June. By the first of July exchange rose to a point where the fear of gold shipments began again and finally an actual shipment of a small amount took place by the 20th of the month. This in itself was sufficient to drive Americans out of the market. Gold shipments indeed were checked by blocks of Lehigh Valley and again by Lehigh Coal Co.'s bonds which were placed in London by Brown, Shipley & Co. at the end of July. But there were other causes at work to hold the market in check through this month and early August. Elections of Parliament filled the last half of July, and this season of the year is always the dullest in business circles. Withdrawals of gold from the United States Treasury, fear of gold shipments, and the call for peculiarly heavy assessments from holders of Erie securities caused considerable selling by holders of Americans at the beginning of August and completely depressed the market. Just at this time also came the big wave of South African speculation which swept everything in the market before it through Au-

gust and September. Everything in the financial situation had been preparing for this event; the enormous mass of idle capital, the absence of suitable fields of investment, which had been offered formerly by American securities from which the investment public now held aloof; the action of conservative banking houses as well as speculative firms, all led up to this remarkable speculation. The "Kaffir circus" was at its height at the middle of September, and has subsided gradually since the end of that month. But strangely enough, the crash which usually follows such phenomena has not taken place. Since these new African securities have ceased to absorb the entire attention of the London market, there has been some dealing in Americans, the market reaching its firmest point about the beginning of October. But recently this question of gold shipments has again frightened English purchasers. It is noticeable, however, that the London market does not fear these shipments as it did in the spring, indicating a decided improvement in the confidence felt as to our currency.

When we compare the situation up to 10 days ago with that of last spring it is clear enough that the English market is no longer unwilling to deal in our securities but that it will be a long time before the old investment demand in London is finally revived to its former strength. The great improvement in our industrial situation, the large crops of the year, the increasing earnings of the railroads, the thorough and successful reorganizations of insolvent companies now in progress, all unite to bring our railroad securities again into a leading place in the London market. But the history of this year shows beyond question that the absolute soundness of our currency is one thing essential to induce English investors to put their capital into our securities as they did only a few years ago.

And now, a situation has suddenly developed which overshadows every other consideration, the end of which we shall not attempt to forecast. It is enough to say that for the present the London market is closed to us.

Mayor Swift, of Chicago, announces that the Chicago & Northwestern and the Pennsylvania have agreed with the city officials to raise their tracks on Rockwell street above the street grades. This piece of railroad, occupied by the two companies named, side by side, is in the western part of the city, and is about 1½ miles long, from Kinzie street southward to Twelfth street. Mr. Swift says also that the elevation of the tracks of the St. Charles Air Line has been agreed upon; "the Western Indiana and all its tenant lines will be elevated; the Fortieth street tracks will be put up out of the way of the Lake Shore, and the Rock Island roads and the Pennsylvania Company will elevate its entire system within the city limits." It does not appear just how much this last clause means, but the whole agreement is the outcome of a meeting Dec. 19, at which were present Mr. Marvin Hughitt, President of the Chicago & Northwestern; Mr. J. M. Whitman, General Manager of the same road; Vice-President James McCrea and General Manager Joseph Wood, and Chief Engineers M. J. Becker and Thomas Rodd, of the Pennsylvania lines; President H. H. Porter, of the Chicago & Eastern Illinois; President Benjamin Thomas and General Solicitor E. A. Bancroft, of the Chicago & Western Indiana; Gen. F. S. Winston, of the Union Stock Yards Company; Mr. John Dunn, Assistant to the President, and Engineer Wadsworth, of the Illinois Central. The elevation of the Chicago & Western Indiana tracks presents many difficulties that the other roads do not have to contend with. It was arranged that an early meeting of the directors of this road shall be called in order to give Mr. Thomas power to act in the matter. Mr. Hughitt said that the Chicago & Northwestern was getting ready to elevate the tracks of both the Wisconsin and Milwaukee divisions in the city next spring. The St. Charles Air Line, controlled by the Illinois Central, crosses the Chicago & Western Indiana tracks just west of Clark street, and its elevation is also dependent on the elevation of the latter. Nothing definite as to details was settled, and there was to be another conference Dec. 27.

The street railroad strike in Philadelphia was reported as settled on the morning of Tuesday last, and it was stated that the strikers would return to work on the company's terms. Much disorder, including some serious rioting, occurred every day for a week and up to Tuesday, except on Sunday and at other times when the company made no attempt to run cars. It was reported on Saturday that the employers and the strikers had come to an agreement, but a few hours later the trouble broke out again. The Second Assistant Postmaster-General went to Philadelphia and conferred with the United States District Attorney concerning obstructions to mail cars on the street railroads. After this a strong force of deputy marshals was appointed, and it appears that the mail cars suffered no further delay. During the six days that the strike continued the company secured about 1,900 new men, and that number of former employees will have to wait for vacancies before they can again be employed. Though a good portion of the cars were run on Monday and Tuesday of this week the number of passengers to and from suburban stations on the Pennsylvania and the Reading Railroads was enormous. Additional trains had to be put on, and at many of the stations the increase in passengers was more than 500 per cent. At the Reading Terminal about 15,000 tickets above the average were sold each day. The disturbances in the streets, the danger of riding in the cars, the inconvenience of walking long distances and the financial loss to the city has caused the strike to be spoken of as the most disastrous ever known in Philadelphia. The Christmas shopping trade was killed, and directly and indirectly it is estimated that the seven days' strike cost the Traction Company, its employees and the merchants $2,000,000.

The police department of New York City, which has done many good things since the former corrupt management was overturned, has at last issued an order that will relieve the city of the odium of being on the same level of civilization as that of the most barbarous parts of Mexico. On the request of the Brotherhood of Locomotive Engineers an order has been issued that when an engineer runs over a man he shall not be arrested, but shall simply be required to give his name and address so as to be accessible when called upon. He will still be liable to answer to a criminal charge, though in all the 18 years that the elevated roads have been running in New York we have never heard that an engineman was found guilty before a court in connection with any homicide. Certainly the presumption is strongly against the supposition that any crime, even negligence, can be proved against an engineman for running over people on a road like this. The speed is moderate, the road is double-track, and tramps do not walk on the tracks. Of the enginemen who have been arrested in the last 10 years not many have actually gone to jail, as bail has usually been quickly provided for, but the mere fact of arrest has often been an annoyance little short of actual disgrace. Presumably the old practice will be continued with motormen and gripmen of street cars. It is difficult to prescribe rules for allowing policemen to exercise their own discretion in such a matter, especially where most of the policemen have not a large stock of that quality available; but with the better class of street carmen the presumption of innocence is nearly or quite as strong as in the case of enginemen on the Elevated

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Station name boards are sometimes so mixed up with advertising placards that they are not readily distinguishable by persons unfamiliar with the stations. This annoyance used to be complained of occasionally in this country, though we never hear of it now; but in England—as true Yankees we blush to say it—the mania for railroad advertising seems to have gone much farther than anywhere in this country, and the obtrusiveness of soap and pill notices at railroad stations has often been remarked upon. Finally, about a year ago, the august Board of Trade took up the subject and sent the railroad companies a remonstrance. The remedy is so simple as to need no explanation, but nevertheless a blue-book of 49 pages has just been issued, and now the curious reader can, if he desires, know all about this subject. For the benefit, however, of those who cannot afford the time to study so abstruse a subject, we will summarize the answers made by the railroad companies to the Board of Trade. In the blue-book this summary takes six pages, but it may all be comprised in a single sentence: each company either has conspicuous signs already or will promptly take measures to see that its signs are made conspicuous. The issuance of this book would seem to indicate that in England, as well as in this country, the Government Printing Office must be kept running at all hazards.

The Empire State Express need not think she rules th world; and she had better not adjust her eyes too continuously to the region of England and Scotland. Competitors may appear nearer home; and, in fact, they have appeared. The Buffalo & Niagara Falls electric cars—and who can blame them, with the Empire State trains rushing proudly past them every day?—have shortened their time to 90 minutes (22 miles). This is not quite up to the 999 record, to be sure; but the "nub" of this bit of news lies in the revelation of the fact that the ambition to make a record has really seized the electric roads. When that ambition once gets thoroughly settled in one's bones there's no telling where or when it will cool down. And then the electric motors have such an advantage in their freedom from the necessity of counterbalancing the drivers. In addition to this, they sometimes have, especially in Buffalo, a 100-ft. way floored with asphalt the whole width, so that there is no great danger if they do happen to run too fast to stay on the rails.

The Railroad Commissioners of Texas, in sending out notices to the general freight agents last week to attend a meeting to consider complaints received from Galveston concerning cotton rates, served on each traffic officer an attachment requiring him to give bond for his appearance at Austin. It is said that this mode of securing attendance is provided for in the law of the state creating the Railroad Commission, but it has never been put in practice before.

NEW PUBLICATIONS.

Compressed Air. Practical Information upon Air Compression and the Transmission and Application of Compressed Air. By Frank Richards, New York; John Wiley & Sons. 203 pages and index. $1.50.

This little treatise is useful and timely, for it explains in language which most intelligent business men will understand, matters which have heretofore been regarded as of interest only to the specialist. This we say in general. In particular we regret to find that the writer has assumed a sort of sentimental attitude, like that of "friends of silver," as the advocate and protector of an oppressed virgin. This, at the outset, makes one suspicious. For instance, he says: "Many intelligent engineers will not consider the claims of compressed air as a means of power transmission," and more to indicate that compressed air is suffering for want of appreciation. But further on we learn that "its use has increased so rapidly in the United States that the compressor builders have been fully occupied in satisfying the demand," and "whatever it is tried for, its use for that purpose continues." The complaint, therefore, hardly seems justified.

We are also forced to dissent from Mr. Richards' enthusiastic belief that in electro-pneumatic signaling, compressed air will continue to be preferred to electricity as a motive power. At no very distant day we expect to see a fully equipped signal system, both block and interlocking, which will be operated entirely by electricity and for this purpose only await the development of the alternating current motor.

The statement (page 4) that "it is notorious that the compressors employed for this service [air-brakes] use five times the steam they should use for the work done and ten times as much steam as the best, designed air-compressors of the present day," gives a misleading impression, which is not corrected until on page 128 the the reader is told that "while the wastefulness of this pump is fully conceded, its persistent use is completely vindicated [because] it is simple, . . . always ready and the steam used to operate it is mostly steam that otherwise would be blown off by the pop safety valve."

But these are, after all, trivial points. The book really deals very clearly with many of the questions to be met with in deciding whether or not to use pneumatic power, and the theory of single and compound air compression is beautifully developed. Tables, formulæ and indicator diagrams abound, but not a single illustration of a typical air-compressor, either in plan or section, is given.

The Practical Engineer Pocketbook and Diary, 1896. Edited by William H. Fowler. Technical Publishing Co., Manchester, England. 1s. 6d. net.

Although this is of pocketbook size and opens at the end, we doubt whether most of the people whom the book aims to serve would be willing to burden their persons with it after the first few days of ownership. This for two reasons: it is too "practical" for the technical man, and too technical for the practical man. It, however, has a certain value for those who are forced only occasionally to step into the realm of applied mechanics, since it contains many suggestions as to the strength, power and dimensions of many kinds of apparatus. On the other hand, it is lacking in much that is essential in a book of its kind. For instance, steam turbines receive no consideration beyond the mere mention of the name, under the head of rotary engines.

The book begins with an excellent index, followed by a treatise on boilers, which, together with the rest of the work, contains the usual tables, and some of them are quite unusual. Economizers, injectors, condensers and fittings are described, and specifications for a Lancashire boiler are given. The different kinds of reciprocating steam engines are noticed with rules for guidances in proportioning their parts; rules for and descriptions of indicators; governors, flywheels, steam pipes and losses by condensation also receive attention. The transmission of power by gearing, rope and belting is fairly well covered, as is also the subject of gas and oil engines, but hydraulic machinery and the designing of tools receive scant attention, while the description of metals, their compounds and attributes, is good so far as it goes, but does not go far enough. The chapter on electrical engineering is particularly disappointing; its scope is too great, since it attempts to cover the whole field of lighting, power and transmission, shop and field practice, within the limits of 50 pages. The advice to inventors under the title "Notes on Patents and Patent Law," will, we think from its opening clauses, induce a good many persons to take out patents who would have been much better off if they had saved their money.

The work concludes with a diary for which we can see no use and which, with some cumbersome advertisements, fills more than one-fourth of the book.

TRADE CATALOGUES.

Modern Locomotives is the title of a well-prepared pamphlet that the Richmond Locomotive & Machine Works, Richmond, Va., have recently issued. It contains 30 pages, the paper and press work both being excellent. In it are a photograph and short description of the works of the company, followed by full page photographs of the locomotives exhibited at the Atlanta Exposition by this company. Following each of these photographs is a table of dimensions, and also a list of the manufacturers of the materials and appliances, such as boiler steel, axles, injectors, valves, etc. The engines illustrated and described are Nos. 546 and 551, for the Seaboard Air Line; No. 100, for the Chesapeake & Ohio; No. 322 for the Southern Railway, and No. 2,427, the exhibition "tramp compound." The book shows drawings and a description of the intercepting valve used in the Richmond compounds.

Railroad Building in 1895.

The new railroad construction in this country, in 1894, was reported at 1,760 miles, and that seemed to be as low a record as was likely to be again made. But the total for this year is about 300 miles less than that, being 1,428 miles. This will, no doubt, be increased by later returns from companies which are still laying track. But it shows that railroad extension is no longer a very important factor in the industrial concern of the nation. That has been true for some years, but there have been so many adverse conditions stopping the expansion of many enterprises just as severely as railroad building could be affected, that there has been a feeling that with more favorable economic conditions, railroad building would again become of great interest and influence. We apparently shall have to conclude that railroad extension hereafter will be small, as compared with what has been done in quite recent years.

The following table shows the new track laid, by states:

Alabama	22.5	Missouri	50.
Arizona	65.3	Montana	5.4
Arkansas	38.	New Jersey	4.6
California	65.5	New York	61.6
Colorado	33.9	North Carolina	44.3
Florida	38.5	Ohio	72.
Georgia	67.7	Oklahoma	49.
Illinois	41.8	Pennsylvania	83.5
Indiana	14.9	South Carolina	1.
Ind. Ter.	144.	Texas	186.5
Iowa	11.1	Utah	4.
Kansas	18.	Virginia	14.
Louisiana	17.	Washington	2.6
Maine	82.	West Virginia	68.5
Maryland	2.	Wisconsin	35.8
Michigan	49.5		
Minnesota	23.86	Total, United States	1,428.4
Mississippi	10.		

Prospective Railroad Legislation in New Jersey.

In the New Jersey Legislature this session the contest for the Speakership hinges chiefly on two railroad questions, abolition of grade crossings in Newark and Jersey City, and state taxation. The *Philadelphia Times* says:

"The fight has already been precipitated by the issue of a preliminary report of the State Board of Taxation, which shows a total valuation of property, $1,007,286,731, and of this amount, $221,576,221, or almost one-fourth of the entire valuation, is returned as railroad and canal property; but the railroads and canals pay only one-sixteenth of the taxes.

"Under the act of 1884, corporations, either railroads or canals, pay but one-half of one per cent. on the valuation of the 'main stem' of their roads and waterways, and the term includes a strip of 100 ft. along the line, taking in depots or any other buildings located within that limit Again, in the matter of railroad property not included in 'main stems' the maximum limit is fixed at one per cent., and the railroads in places like Newark and Jersey City own millions of dollars' worth of valuable property that escapes with a one per cent. rate, while private property in Newark is assessed at $1.98 and in Jersey City at $2.76. But when it comes to the grade crossing question, Newark is clamoring loud and long for relief. In order to secure the necessary legislation both Essex and Hudson counties must unite and wage their fight hand in hand The Pennsylvania, the Central of New Jersey and the Delaware, Lackawanna & Western own two-thirds of all the railroads in the state and control much of the remaining third.

"There will be a stiff fight on the abolition of grade crossings in cities. It will be a fight between the country members and the country districts, with Derousse as their representative, against the cities, represented by Skinner. Both Essex and Hudson counties, in which are the cities of Newark and Jersey City, are united in favor of most stringent grade crossing measures. With Skinner as Speaker, with the appointment of the railroad committee in his hands, success is almost assured."

TECHNICAL.

Manufacturing and Business.

The Eureka Cast Steel Co., of Chester, Pa ,will resume business shortly, after ten months' idleness.

The Barfield Car Coupler Co. was incorporated at Chattanooga, Tenn., last week, by H. Clay Evans, George W. Barfield and others. Messrs. Barfield and G. H. Pierce, of Chattanooga, are the patentees, the former being car inspector of the Southern Railway at Chattanooga.

Stacey Reeves & Son have the general contract for the erection of a four-story tank shop, 129 ft. × 175 ft. for the Baldwin Locomotive Works, on Seventeenth street from Buttonwood to Hamilton streets, Philadelphia, and a two-story smith shop, 195 ft. × 50 ft. on Hamilton street.

George D. Burton, Manager of the Burton Stock Car Company, has filed a petition in insolvency in the Suffolk County Court, Massachusetts. His liabilities are given as $117,000.

The Hurst Air-Brake Co. has filed articles of incorporation in Salt Lake City, with Richard Mackintosh, W. H. Bancroft, John M. Hurst, George Goss and Jacob N. Rock, of Salt Lake, as directors. Richard Mackintosh is President and C. L. Robertson Secretary and Treasurer. The company is to manufacture an air-brake device, invented by John Hurst.

The Pittsburgh Malleable Iron Works is to remove from its present location in Lawrenceville to East Pittsburgh next summer, and an important enlargement of the plant will be made at the same time. The plans for the new plant have been prepared and the contract for erecting the buildings has been let.

The Westinghouse Brake Co. may locate a factory at Ottawa where the company has been offered a site for its building free of cost.

The shops of the United States Car Co., at Anniston, Ala., which were reopened a few weeks ago, are now quite busy. At present about 250 men are employed, and this force is being gradually increased. The plant has not previously been in operation for some years, and a good deal of work has been necessary to put the machinery in good order. and in the rolling mills particularly important improvements and repairs are now about finished. The orders now on hand include one for repairing about 130 freight cars for the Seaboard road of Alabama and an order for new cars for the Chattanooga Southern.

The main building of the West Bergen Steel Works, located on Communipaw avenue, near the Hackensack River, at Jersey City, was destroyed by fire Dec. 21, together with $100,000 worth of machinery used in rolling cold steel, making steel wire and polishing bicycles. The building was a frame structure, 28 ft. high, 50 × 50, and was owned by the West Bergen Land Improvement Company. The origin of the fire is unknown, but it is supposed to have been caused by a spark from a locomotive.

The plant of the New York Frog & Switch Co. will be sold at public auction Thursday, Jan. 9, 1896.

New Stations and Shops.

The item in the issue of Dec. 13 that a new passenger station would soon be erected at Charlotte, N. C., by the Southern Railway Company was a mistake. The building at Charlotte, which is a very neat and commodious structure, was completed several months ago. The item referred to buildings that will be erected during the coming year at Greensboro, N. C. There will be both a freight house and passenger station. The business at this point is very large and the present buildings are inadequate.

At a special meeting of the City Council of Richmond, Va., last week, the Chesapeake & Ohio Company presented an ordinance to enable it to effect extensive terminal improvements. These consist of a passenger station and general offices and train-shed, and also an elevated iron viaduct to reach the new station. It is understood that the cost of the improvement will be nearly $2,000,000. The station is to be erected on Main street, near Fifteenth street.

The agreement between the officers of the Canadian Pacific and the city authorities of Montreal in regard to the proposed new "east end" station in that city seems to have been finally concluded, as stated a few weeks ago. In the first agreement made by the city it was agreed that work should be commenced in September, 1894, last, but that was not done on account of delay in the transfer by the city of certain land as agreed upon. The transfer of the land to the railroad company will now be made immediately. The plans of the station prepared by the railroad company have been agreed to by the city. The structure will resemble in some way the Chateau Frontenac, at Quebec, which was built by the railroad, and, like that structure, the Montreal building will be a hotel as well as a railroad station. It will front 300 ft. on Craig street. The first story will be of stone and the rest of the structure of white pressed brick. The total cost is estimated at about $300,000.

The shops of the Ann Arbor Railroad at Owasso, Mich., which were burned recently, will probably be rebuilt immediately at that town. The rebuilding of the shops depends upon arrangements made by the town authorities for fire protection, and General Manager Ashley has been promised that his suggestions in this line will be carried out by the town.

The plan for a new union station at Fort Worth, Tex., seems to have fallen through on account, it is said, of the high price for land demanded by property owners. The plan was originated by General Manager Yoakum, of the Gulf, Colorado & Santa Fe road, and the officers of most of the other roads entering Fort Worth had joined in the organization of the corporation to build the station.

Iron and Steel.

The Bar Iron Association, after a three days' meeting at the Auditorium Annex, Chicago, adjourned Dec. 19. It is understood that a reduction of $3 a ton on all lines goes into effect Dec. 23.

The Illinois Steel Company, of Chicago, has just closed a contract with the Pocahontas Company, of Virginia, for the purchase of 500,000 tons of coke during 1896 The supply is to run from 35,000 to 45,000 tons per month. The coal is to be carried in cars of the Illinois Steel Co. This order has heretofore gone to the Connelsville district.

Trial of the Engines of the Battleship Texas.

The second-class battleship Texas had an official trial Dec. 19, off Sandy Hook, to test her engines and boilers. It was required that she run four miles at the maximum speed developed under the highest boiler pressure allowed. The trial was not completed, being interrupted after three hours and six minutes run, during which an average speed of 17.82 knots is said to have been reached. The insufficiency of the engine room drainage system led to the collection of water in the crank pits, the water being that used in cooling the bearings, an it was impossible to proceed with the trial. Computation from unofficial data shows that the main engines developed an average of 8,900 H. P., with an average of 126 revolutions per minute. The highest speed made was 18.5 knots. The average steam pressure was about 143 lbs. The engines were built by the Richmond Locomotive & Machine Works, which was represented at the trial by President W. R. Trigg and Vice-President Joseph Bryan.

A Suit About Water Tube Boilers.

On November 19 a suit was begun by the Philadelphia Edison Electric Light Co. against the Abendroth & Root Mfg. Co., of New York City, to recover $34,000. A countersuit was put in by the latter company for $6,830.99, for payment for other material furnished the electric company, and for amount still due on the boiler contract. This suit was tried in the U. S. Court in Brooklyn, before Judge Wheeler, and a verdict has been rendered in favor of the Abendroth & Root Mfg Co., for the amount of the countersuit.

The Abendroth & Root Mfg. Co. make the well known Root water tube boiler, and between 1889 and 1894 they furnished the Philadelphia Edison Electric Light Co. with about 3,500 H. P. of boilers.

Soon after these boilers were erected, a series of troubles followed, which finally culminated in a fatal accident. This brought the matter into the Coroner's Court in Philadelphia, where a verdict was rendered acquitting the Abendroth & Root Co., holding the Edison Co. responsible.

The evidence brought out the fact that the makers of the boilers had lived up to their contract, and had used the best materials procurable. The Edison Co. is said to have used the boilers far beyond their rated capacity, to have employed unskilled labor, to have used very bad feed water, and an excessive forced draft.

Ordnance for the United States Government.

The first of the 100 8-in. guns ordered by the United States Government from the Bethlehem Iron Company was tested recently at the proving grounds of that company at Redington. Ten shots were fired, and it is said that the gun came up to every requirement.

A new rapid fire Maxim gun arrived in New York recently from Liverpool. The gun was being sent to Washington. It is a little over 4 ft. in length, and weighs about 127 lbs. The inventors guarantee that it will fire 600 shots per minute or 10 shots a second. It is adapted for the use of smokeless powder, and is intended especially for defense against high speed torpedo boats having light armor.

Elevated Tracks in Bridgeport.

A press dispatch from Bridgeport, Conn., states that the officers of that city have reached an agreement with the New York, New Haven & Hartford concerning the abolition of grade crossings. The line of this road through Bridgeport is crooked and the right of way is closely hemmed in by buildings at many places; and in addition to this there is a difficult drawbridge problem close to the station. The question of changing the grade has been under discussion several years, during which time nearly the whole of the remainder of the New York division of this road has been rebuilt and made four-track. The Bridgeport problem was long delayed by the disagreement between the New Haven road and the Housatonic, and since the purchase of the latter road by the former there have been protracted disagreements between the road and the city concerning the apportionment of the cost. There are about 30 street crossings to be dealt with, and it is stated that the total cost of the improvements will be two or three millions. It is said that the negotiations now completed have resulted in limiting the city's share to $400,000, and it may be much less than that. It is provided that the new station shall be on or near the site of the present building.

Tests of Rapid-Fire Guns.

The Reports of the Ordnance Board charged with conducting tests of four-inch rapid-fire guns submitted for acceptance by the army, have been received by the Chief of Ordnance, and show that two of the guns tested burst during their trials. The other gun presented—that of of the Driggs-Schroeder type—stood the test well, and as a result of its inspection the Ordnance Board reports that the gun has shown itself to be a simple, safe and efficient mechanism for a rapid-fire gun of this character. In the rapidity test the total time for the 25 rounds fired was 2 minutes 34 seconds.

The Hartford Bridge.

The highway bridge across the Connecticut River at Hartford, Conn., was carried away by the high water in the river on Dec. 23. The old wooden bridge at this point was burned several years ago, and the structure now destroyed was a temporary one resting mostly on piles. Some of these piles appear to have been washed out at the bottom. The press accounts make a good deal of the alleged fact that "traffic across the river is entirely suspended"; but why the railroad company does not put on extra trains and carry across the railroad bridge the thousands of anxious farmers, and thus rake in basketfuls of money, does not appear.

Bessemer Steel in England.

The British Iron Trade Association has lately issued returns showing the make of Bessemer steel in that country for the first half of the current year. The Bessemer ingots made amounted to 801,860 tons against 810,392 tons in the first half of last year, 781,712 tons in the first half of 1893, and 649,816 tons in the first half of 1892. Although these returns show an improvement as compared with quite recent years they indicate a very considerable falling off as compared with 1889, for instance. In that year the Bessemer ingots produced in Great Britain amounted to 2,140,000 tons, and before that even a larger product was turned out. The production for the first half of this

year is at the rate of 1,603,720 tons. Of course the late decline is attributable to the falling off in the rail market. In the half year under consideration only 312,000 tons were made, a trifling figure compared with the time before the United States and the Continent undertook to make their own rails. There is an increased demand for miscellaneous articles such as blooms, billets, tin bars, etc.

The French Torpedo Boat Forban.

We reported some weeks ago the extraordinary performance of the Forban, which attained a speed of 31.029 knots per hour. Some further information about this remarkable boat was given by M. G. Hart in a paper read before the French Soc. C. E , on Oct. 18.

The next best performance is that of the torpedo boat Sokol, built for Russia by the Yarrows, of Poplar, England, which speeded up to 30.285 knots per hour. The small difference of 0.744 knots appears, however, large in the light of the following figures: The Sokol displaces 260 tons, the Forban 125 tons. The proportion of weight of armament to displacement is for the Forban 125 ÷ 16 = 0.128; for the Sokol 260 ÷ 30 = 0.115. The Sokol has somewhat finer lines. The principal cause, however, of the success of the Forban is found in the almost absolute suppression of vibrations, which allows the use of the full power of the engines without undue over-exertion of the hull and the screw. For its Sharpshooter type of torpedo boats the English Admiralty had to concede a reduction of speed of two knots, and the failure was principally charged to vibrations. Vibrations, again, produce further inconveniences inasmuch as they render the aim uncertain, and make even short cruises unendurable for the crew, if there is some sea on. Care has therefore been taken to counterbalance all weight of metal in motion, and to prevent the deformation of the boat by the machinery, by means of diagonal ties between the keelson and the framework of the bridge. Care has also been taken that each of the three cylinders of the two triple-expansion engines, which aggregate 3,700 H. P., develops exactly as much power as its neighbor, so that no equalizing of differences is imposed on the crank shaft. Thus another source of vibration is eliminated. When steaming under full power 1.76 lbs. of coal were consumed per horse power hour, and for somewhat lower speed 1.1 lbs. per horse power hour.

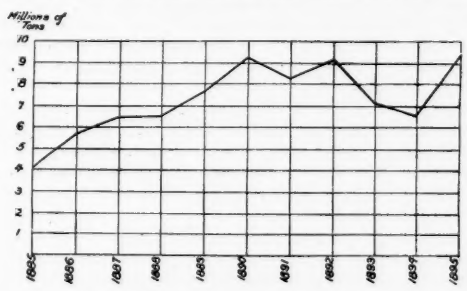
Additional details are contained in the *Moniteur Industriel* of Nov. 23.

Pig Iron Production for 1895.

The production of pig iron in the United States for the month of December, 1895, it is estimated by the *American Manufacturer*, will be 965,597 tons. This is at the rate of 31,148 tons a day, which was the average daily production during November. The production during the past 11 months, according to the above journal, was as follows:

Month.	Production: Gross tons.
January	765,329
February	619,317
March	697,144
April	668,713
May	691,216
June	701,567
July	772,423
August	833,256
September	860,130
October	938,498
November	934,449
December estimated	965,597
Total	9,387,639

This total, while it may vary a few thousand tons, is probably very close to the actual year's production, and it is not only larger than the production for any other one year since 1884, as shown on the accompanying diagram, but is greater by 800,000 tons than the maximum output of Great Britain up to the present time. This maximum, reached in 1882, was 8,586,680 tons. Great Britain produced 7,364,745 tons in 1894, and unless she greatly exceeds this figure during the current year, the production of the United States for 1895 is likely to be the highest figure ever reached by any country.



Production of Pig Iron in the United States from 1885 to 1895.

The diagram shows the production each year from 1884. In 1885 we produced 4,044,526 tons. In 1890 the highest figure exclusive of 1895 was reached, 9,202,703 tons. The production for 1894 was 6,657,388 tons.

Car Lighting.

We are informed by the Safety Car Heating & Lighting Co. that the Chicago, Burlington & Quincy and the Atchison, Topeka & Santa Fe have directed that all the Pullman cars assigned to the service of those lines shall be equipped with Pintsch lights. This will cover 50 to 60 cars. There are Pintsch gas plants along the line of the Atchison at Chicago, St. Louis, Kansas City, Fort Worth, Houston and Denver, and along the Burlington at Chicago, St. Louis, Council Bluffs, Kansas City, Minneapolis and Denver which will take care of all of their equipment.

New Postal Cars in Brooklyn.

Five new postal cars were put in service on the Brooklyn Heights Electric Railroad on Wednesday, Dec. 18. The cars were built by the J. G. Brill Company, of Philadelphia, and are 24 ft. 8 in. long inside and 35 ft. over all. The mail compartment is 12 ft. long inside measurement by 7 ft. 4 in. wide and is fitted up with the usual railroad post-office fittings, consisting of 200 pigeon holes for distribution of mail, standard pouch racks, sorting tables, etc. These cars will be run as sub-post-offices, and stamps may be purchased from the postal clerks in any quantities

The passenger compartment is 12 ft. in length, having reversing Hale & Kilburn seats upholstered in rattan. The car seats 20 passengers. Electric bells are placed opposite each seat for signaling the conductor The platforms are 4 ft. 6 in. long, with a large single door opening into the car, near the step instead of at the center of the car as is usual. There are 8 lights in the passenger end and 10 lights in the postal end of the car, together with platform lights and ane lectric headlight. The passenger end of the car is equipped with the Consolidated Company's electric heater and the postal end with the Central Company's heater. The cars are carried on two 4-wheel trucks. The motors were made by the Westinghouse Electric & Manufacturing Co., and the controllers by the General Electric Co.

These cars, we are informed, will be used as ladies' cars and will be run upon a regular time-table between the City Hall and Hunter's Point via Myrtle avenue and the regular crosstown route through Washing avenue. They will also be run on Fulton street between City Hall and East New York. Time-tables are placed in each car. The first run of one of these cars was made on Monday, Dec. 16, at which time a short excursion was given by the railroad company. A number of representatives of the railroad, the press, etc., were present.

Electricity on the Brooklyn Bridge.

In a brief abstract of the last annual report of the President of the New York & Brooklyn Bridge printed by us Dec. 13 we said, referring to the proposed trial of electric traction: "Of course the purpose primarily of this installation is to try electric traction in a small way with a view to its ultimate adoption." We are informed on the best authority that there is no present intention of using electricity for running the trains over the bridge. If the tests now contemplated are satisfactory electric motors may be substituted for the locomotives which now do the switching at the stations. It is not believed, however, that the cables will be replaced by electric traction.

A New Lift Bridge for Kansas City.

A large lift bridge is soon to be built at Kansas City over the Missouri for the Kansas City & Atlantic Railroad. The bridge is to be near the foot of Oak street and the old piers at present in the river will be used for it. The new bridge has been designed by J. A. L. Waddell and the plans are now being prepared for inspection by the War Department at Washington. The bridge will of necessity have a channel span that will allow of the passage of vessels. A lift span has been adopted in this case similar to the well-known Halsted street lift bridge in Chicago, also designed by Mr. Waddell.

The piers now standing in the river, which were originally built for a bridge at that point to cross at a height above the river sufficient to allow vessels to pass under it, are too high for the proposed low-level structure and therefore, 52.9 ft. will be taken from the top of each pier, bringing the bridge level down to about 25 ft. above the ground at the Kansas City end. This low type of bridge is desirable because the railroad company wishes to land its trains on the levee and not to run them directly from the bridge to the bluffs along the river. This will enable them to use the land recently purchased for terminal purposes along the river front.

The bridge will be of steel with a lift span 421 ft. long. This span will be near the south end between piers 4 and 5. A permanent span will be built between these piers about 54 ft. above them. Below it will be a deck span resting on the piers. When it is desired to open the draw, the deck span will be lifted 45 ft. by means of counterweights which will very nearly equal the weight of the span, so that 8 men or a light motor can raise or lower the structure easily.

By cutting off the present piers, 13 ft. will be gained in their width. This will enable the superstructure to be a wide one, which is desirable, since the plan provides for a double track railroad bridge with a wagon road and a footpath on each side. The railroad portion of the bridge will be 32 ft. wide. The wagon ways will be 11½ ft. each, and the footpaths 5 ft. each. This will make the entire width of the bridge 65 ft.

THE SCRAP HEAP.

Notes.

The Connecticut Railroad Commissioners, upon the petition of the city of New Haven, have ordered all street railroad companies in that city to equip their cars with the Darrach wheel fender.

The Southern Pacific has just received a new rotary snow plow, making five in all now ready for service on that road. Three of these plows are located in the Sierra Nevada Mountains, one on the Salt Lake Division and one on the Shasta route.

Near Montpelier, Ind., on the night of Dec. 19, a passenger train on the Lake Erie & Western was boarded by robbers, with whom, according to the report, the conductor and passengers had a considerable fight, although pistols did not figure in it. The robbers were soon routed, but they carried off some overcoats and hand baggage.

In Denver, on Dec. 14, a street car motorman who was half asleep ran his car upon a crossing of the Union Pacific, Denver & Gulf and derailed a passenger train, besides wrecking his own car and causing his own death; and now it is announced that the Denver Tramway Company will "right away" begin putting in derailing switches at every steam railroad crossing.

On the Atchison, Topeka & Santa Fe trip passes for 1896 will be made out on the National Safety Ticket Company's paper, on which writing cannot be altered without detection. The colors of all the different classes of passes on this road will be different from those now used, but, we are informed by a Topeka paper, this is not objected to by those who seek passes. The demand has not fallen off.

The Relief Association of the Philadelphia & Reading Railroad, in view of the large surplus fund now on hand, has voted to increase the amount of death benefits to $100 each. A member whose payments have been based upon the expectation of his family's receiving $250, in the event of his death, finds his policy advanced to a value of $350, while the certificates of those insured for $500, $750, $1,000 and $1,200 are each now worth $100 more at death, the additional $100 being paid from the surplus fund without regard to the amount of the original insurance.

The Railroad Commissioners of Connecticut have given formal authority to the New York, New Haven & Hartford to run a large number of trains on Sunday. One of these is an accommodation train between New Haven and Willimantic, which takes the place of the through afternoon express trains between Boston and New York which formerly ran over this division on Sunday, but now do not; most of the other trains have long been running on their present schedules, but without specific authority from the Commissioners. Most of the trains run early in the morning or late in the afternoon or evening.

Floods did considerable damage in various places in the West last week. Near Lockport, Ill., press dispatches reported that a half mile of track of the Atchison, Topeka & Santa Fe was washed away by the overflowing of the Illinois & Michigan Canal. In the city of Chicago 5½ in. of rain fell in 48 hours. Several small bridges were washed away on the Missouri, Kansas & Texas in Missouri. In Kansas there was a snowstorm. A dispatch from Joplin, Mo., reported the loss of a $10,000 bridge over the Sac River which had only recently been built. The St. Louis, Iron Mountain & Southern iron bridge at Fort Gibson, I. T., went down Dec. 22.

George W. Monteith, of San Franciso, who was instrumental in bringing out the evidence that Frank M. Stone held a complimentary pass over the Southern Pacific, has written a letter to Attorney-General Harmon, stating that he has further evidence The case came up in the investigation of the strike of 1894, and it was shown that Mr. Stone started from San Francisco for Oregon, riding on a pass issued by President Huntington; but the train was stopped by the strikers, and when Mr. Huntington was indicted for illegally giving the pass he was let off by the court, as it was shown that Stone did not actually travel beyond the state line. The new evidence now brought forward concerns another interstate trip made by Mr. Stone, which, it is said, was completed.

Fog Signaling in London.

The cost of making train-running safe when the roadway is enveloped in a London fog, is the subject of an article in the (London) *Railway News* of Nov. 30. After a facetious introduction, in which it is suggested that the railroad companies combine to lay before Parliament a bill for the abolition of fogs, the writer describes the practice of a certain large road on nine miles of its main line in London. Including the London terminus there are in this section nine stations. The largest has 48 fog signal posts, the next 29, the third 34, etc., and the whole section of nine miles requires 157 fog men. In crowded places the fog man stands in a pit between two adjoining main tracks. The enginemen are averse to the use of automatic contrivances, which, as they say, "can't swear at a chap if he doesn't pull up when he ought." To man this nine-mile section for six hours, morning to noon, costs $65. Refreshments, when furnished by the man himself, are allowed for at the rate of 18 cents per man per shift, which would mean nearly $24 for half a day. In the period named about 5,000 torpedoes would be used, which would cost about $85, the lowest price being $1.75 per gross. Another large English road estimates that for the past seven years it has used 330,000 torpedoes annually, which, at 10 shillings a gross, would cost nearly $6,000. In view of the great density and blackness of London fogs it is wonderful that so few collisions occur. One of the most prominent that ever did occur from this cause was that of Feb. 10, 1886, at Finsbury Park, due to the mistake of a signalman who had received 18 bonuses for good conduct, and who had been on duty only two hours at the time of the accident. Not a single passenger had a bone broken, yet claims were presented by no less than 347 persons, and the collision cost the road $165,000. The Superintendent of the road whose practice is described in this article says that although the prevailing method of fog signaling is both primitive and old-fashioned, they dare not use any other. Only by stationing a man at each signal can the engineman have a positive assurance that the signal indicates all-clear. Experienced fog men always give a hand motion signal to the runner if the way is clear, and also, when practicable, shout to him besides.

Paul Morton's Victory.

Paul Morton, who was lately elected Third Vice-President of the Atchison, Topeka & Santa Fe, has just won a victory which he would probably rather not have gained. As President of the Colorado Fuel & Iron Company he brought complaint before the Interstate Commerce Commission against the Atchison and the Southern Pacific of unjust discrimination in rates from Pueblo to San Francisco, and the commission has now held that the rates complained of were unreasonable, and ordered that the rates from Pueblo to San Francisco should not exceed 75 per cent. of those charged on like traffic from Chicago to San Francisco. In order not to embarrass Mr. Morton when he assumes charge of the traffic affairs of the Atchison, the officials of the company have reduced the rates on the products of the Colorado Fuel & Iron Company to the figures named by the Interstate Commission. This is the promptest compliance with an order of the Interstate Commerce Commission on record.—*Chicago Press Despatch.*

The Antofagasta & Bolivia Railroad.

The report of the Antofagasta & Bolivia Railroad for the year 1894, recently issued by the Directors of the Compañia Huanchaca de Bolivia, shows a slight falling off from the results of the previous year, the net receipts, stated in Chilian currency, being respectively $2,094,319 and $2,246,064. The difference, being only $151,745, would appear insignificant, but this diminution took place in spite of a gain in gross receipts of $45,890, the working expenses in 1894 having been 62.48 per cent. of the income, against 59.43 per cent. in 1893. This is explained by the circumstance that charges for transportation of ballast hauled in 1893 could not be entered upon the accounts of that year, but were carried over to 1894.

This railroad is divided into two very distinct sections, one from the port of Antofagasta to Uyuni, in the Bolivian highlands, running easterly over the mountains, and the other traversing the plateau from north to south, extending from Uyuni to Oruro. The gross traffic on the Antofagasta section amounted to $4,748,772, being an increase over the preceding year of $57,608. At the same time there was a slight decrease ($4,290) in passenger receipts. The Oruro section shows a gross income of $833,508, being a decrease of $11,719 over that for 1893. The passenger receipts, however, increased $8,805. The falling off in general traffic on this section is due to a settling down to a normal condition of the trade movement which had been temporarily stimulated by the opening of this part of the line in 1893. The increase in passenger traffic, on the other hand, is a favorable sign, indicating a disposition to develop internal commercial relations throughout the Bolivian plateau region.

The report issued by the Compañia Huanchaca de Bolivia consists of three parts, one devoted to the Antofagasta & Bolivia Railroad, one to the mining interests of the company, and one to tables representing the operations of the mines. The report on the mines contains an illuminated vertical section of the Pulacayo mine and a description of the extensive plant of this company. It has long been the practice of this company to continue its development work *pari passu* with the extraction of mineral, so that to-day it has ore bodies carefully measured up and valued, available for exploitation, which contain 2,035,348 avoirdupois pounds of silver. It is this provision for the future that has enabled it to build a great railroad, primarily for its own convenience, and to undertake other works of magnitude and permanence. The company employs in the mines and metallurgical works alone 617 operatives, and for their benefit maintains a free hospital and a school for their children. The total net income of this corporation for the past 18 years has amounted to $30,822,150, out of which it has paid in dividends the sum of $24,244,319.

Receivership Complications in the Courts.

Hon. Judson Harmon, Attorney-General of the United States, in his annual report, recently sent to Congress, discusses an important question affecting long lines of railroad, belonging to weak companies, as follows:

The Northern Pacific Railroad litigation has called attention in a striking way to the necessity which has long existed of legislation to regulate the appointment of receivers and judicial sales of railroads, parts of whose lines are in different circuits. Public, as well as private, interests require the preservation of the unity of such lines in their management pending the foreclosure, and in their sale. This can now be accomplished only by harmony of action among the courts of the various circuits, but the appointment of receivers and the repetition of orders in each circuit cause a multiplication of trouble and expense which can well be avoided. When, however, the different courts refuse to co-operate, not only are public and private interests in the property imperiled and costs more greatly multiplied, but there is constant risk of scandal, from which the administration of justice should be kept free.

There seems to be a general demand for relief. It can readily be afforded by providing that suits to foreclose mortgages or appoint receivers of such railroads shall be brought in the circuit where the principal operating offices are, or in the circuit in which the chief terminals are situated, or in that containing the greatest length of track, or full jursidiction might be given to the court in which suit is first brought.

The Attorney-General also speaks briefly of the decision of the Supreme Court in the Debs contempt case and says that the principles established by the opinion are of the highest value and importance. Discussing the relations of the Union Pacific to the Government, he says: The situation has been maintained, as it was when the last Congress adjourned, so far as legal proceedings are concerned, but large amounts of subsidy bonds are about to fall due of those issued to the Central Pacific as well as those issued to the Union Pacific Company, and no assurance can be given that the present situation will be long maintained. Action should be promptly taken toward working out some solution of the problem. There should be a law giving some proper court in the District of Columbia jurisdiction of the entire property and of all the parties in interest. What has been hereinbefore said as to the general necessity of giving one court full jurisdiction in such cases applies with especial force here.

As Others See Us.

M. Henri Alexandre, in *L'Ingenieur Civil*, for October, makes various comments on American railroads, which are summarized in the *Trade Journals' Review*, Manchester, England, as below: M. Alexandre condemns the permanent ways of American roads, which he says appear to French eyes to be very bad. The rails uniformly adopted he found to be the Vignole type, fixed by cramp-irons to sleepers very close together. As the rolling stock is very heavy, and the rails very badly supported, the sleepers exposed to the air perish very rapidly; the pattens of the rail penetrate them, the cramp-irons loosen themselves daily on the great lines, and often can be easily withdrawn by the hand. While the locomotives have a majestic appearance, from their great size and power, the companies have only one class of machines for both passenger and merchandise. The combustion and large consumption of steam is very great, which soon deteriorates the engines; and the simpleness and cheapness of the construction cause American engineers to rather replace a machine frequently than pay high prices for good ones at the outset. The ordinary carriages are, M. Alexandre considers, very superior to the French third class carriages, but very inferior to the first class, from some points of view. The passenger cars are, on the whole, however, in the view of the French critic, admirable, and he draws especial attention to their freedom from vibration, even when crossing joints—a fact he believes to be to some extent due to their great weight. He points out that the passengers in the cars cannot open a window even a few centimeters square. This, while it prevents the disagreeable currents of air caused by the occasional eccentricities of French travelers, has drawbacks. The conductors of American cars are all negroes, who never find themselves warm enough, and people are almost suffocated in these vehicles, which are nearly as tightly closed in summer as in winter. The reclining and other comforts which are provided for drivers on engines in America lead them, when overcome by the heat, to sleep, so that they are not often alive to dangers.

Profit Sharing.

We frequently run upon instances going to show that the so-called wage-earning class gets about all the sympathy it deserves. N. O. Nelson, a machinery manufacturer, of St. Louis, is an employer anxious to do a little more rather a little less than he is called upon to do. Some years ago he introduced the profit-sharing plan into his factory, and since then, without cutting wages a cent, he has divided up each year among the men the profits from the business, after deducting a certain amount for interest on capital. Recently he concluded to go even further. He determined to sell his factory to his workmen, letting them pay for it out of these profits voluntarily given them. They struck at once. They wanted no factory. If anything was to be given them, let it be money paid out every Saturday night. Mr. Nelson took them back on the old terms. In the course of six or seven years they could have owned the factory. We may possibly find in this attitude of the men a result of coddling. That is what profit-sharing without loss-sharing amounts to. Men who are given above their regular wages a share of the profits in good times, without liability to a share of the losses in bad times, are the recipients of a gratuity which they soon come to regard as their just due, and they naturally grow into the temper of an overfed subject of charity. Why, indeed, should they want the factory with all its liability to losses as well as profits, when they now get the profits without any risk of loss?—*Springfield Republican.*

To Build Railroads in China.

The American-China Development Co. filed articles of incorporation in New Jersey last week, the object of the corporation being given as the operation of railroads, steamship, telegraph and telephone lines in China. The capital stock of the company is $1,000,000. Among the corporators are Frank Tranholm, of New York; D. H. Lyon, of Greenwich, Conn., and S. S. Walters, of Jersey City.

American Equipmetn for Export.

The New York Equipment Co., of 80 Broadway, New York City, recently sent out on the steamship Ardandhu, one of the largest steamers plying between New York and Central America, a large amount of equipment for the Jamaica Railroad, which is being extended for about 60 miles, by the firm of James P. McDonald & Co., of New York City. The cargo comprised four 65-ton compound locomotives, one switching locomotive, two passenger cars and 60 freight cars.

Politics and Pooling.

Confidential interviews with leading Senators at Washington develop the fact that the proposition to pass the railroad pooling bill through the Senate first and defer action in the House until after the election next fall, will arouse opposition that will be fatal to the measure if the programme is persisted in. The essence of the sentiment discovered by means of personal interviewing is that for political reasons many Senators who are naturally friendly to the railroads and whose votes would be necessary to the passage of a pooling bill, will resent any open attempt to use the Senate as a convenience to gain time. At least, that will be the explanation the railroad men will be asked to accept.

The real reason will be that there are several Senators who regard themselves as Presidential or Vice-Presidential possibilities, who are quite as anxious to stave off a vote on the pooling bill as any member of the House of Representatives figuring on a re-election. These gentlemen and their friends will interpose a passive but none the less fatal obstruction to the pooling bill if the managers of the campaign on behalf of the railroads undertake to crowd it down the Senate whether or no.

One of the most influential Senators on the list and a recognized friend of corporate interests said to me last evening: "If a pooling bill should come before the Senate in a proper way I should probably vote for it, but I will not permit myself to be dragged in by the neck to support the bill. The popular branch of Congress (the House) is the proper place for the railroad people to go first with their pooling bill. If they succeed there they can bring it over to us. It would be the height of unwisdom for them to try to crowd the measure through the Senate before getting an expression from the House. It they try it they will regret the day they decided to engage in the enterprise."—*Wall Street Daily News.*

LOCOMOTIVE BUILDING.

The Fitchburg Railroad has let a contract to the Schenectady Locomotive Works for five compound locomotives.

The Schenectady Locomotive Works is building five 10-wheel engines for the New York, Chicago & St. Louis.

The Brooks Locomotive Works has an order from the New York, Chicago & St. Louis for building five 10-wheel freight locomotives.

The Pittsburgh & Lake Erie will shortly give out orders for eight new freight engines. The engines will probably be built by the Pittsburgh Locomotive Works.

The Schenectady Locomotive Works has received an order from the Boston & Albany for four heavy locomotives similar in type to those built in 1894 for the same company.

The Midland Terminal of Colorado has awarded a contract to the Schenectady Locomotive Works for building five locomotives. These were referred to in our issue of Dec. 13.

The Boston & Maine last week let an order for 25 locomotives. The Rhode Island Locomotive Works will build 20 of the engines, the Manchester Locomotive Works getting the contract for the other five.

The Baldwin Locomotive Works has received an order from the Kansas City, Pittsburgh & Gulf for building ten 10-wheel engines The company is also working on an order from the Baltimore & Ohio Southwestern for six passenger and five 10-wheel freight engines.

CAR BUILDING.

The Western Meat Refrigerator Co., a Kansas corporation, has leased 91 cars from the Missouri Car & Foundry Co. at St. Louis. The cars will be lettered "Southwestern Refrigerator Despatch."

BRIDGE BUILDING.

Adel, Ia.—The Board of Supervisors will meet in January and decide upon the bridge work for the year beginning April 1. Proposals will be received at this meeting for bridge work.

Atlanta, Ga.—It is probable that the overhead crossing of the railroad tracks at Jones avenue, this place, will soon be built.

Atlantic Highlands, N. J.—The contract for the stone bridge over Grand avenue, the advertising for bids for which was noted in a recent issue, has been awarded to Nimrod Woodward. The estimated cost is $2,500. George F. Lowrie will superintend the construction.

Belfast, Me.—It is proposed to build a bridge over the harbor at Main street, the location of which it is said has been approved by the War Department.

Bloomfield, Ind.—The contract for a bridge at Worthington, Ind., has been awarded to the Indiana Bridge Co.

Brandon, Man.—Bids are asked for a new bridge over the Assiniboine at Brandon, Man.

Buffalo, N. Y.—The contract for the superstructure for the new lift bridge over the Buffalo River at Michigan street has been awarded to the Wisconsin Bridge Co., of Milwaukee, at a price of $38,700.

Burlington, Kan.—Bids will be received until Jan. 13 for an 80-ft. steel highway bridge with a roadway 12 ft. wide.

Cheyenne, Wyo.—It is reported that a bridge is to be built over the North Platte River, near Fairbank, which is to be used by the Union Pacific, Denver & Gulf. Proposals will be received for the bridge until January 8. Address L. G. Jenks, County Clerk.

Chicago, Ill.—The substructure for the new rolling bascule bridge over the north branch of the Chicago River, at North Halsted street, is to be built at once. Proposals for the work will be received until Dec. 28. The work consists of pile and timber work and masonry and concrete foundations.

Denver, Col.—The State Board of Construction met Dec. 18, and opened bids for the erection of the Prowers and Summit County bridges. The bids were taken under advisement. The appropriation for the Prowers bridge is $5,000 and the Summit bridge $4,500.

Detroit, Mich.—Senator McMillan, of Michigan, has presented a bill in Congress to authorize the construction of a high-level bridge across the Detroit River at Detroit, and the newspapers say that the Michigan Central Railroad has decided to build the bridge as soon as authority is obtained. Coincidently there is an application before the Canadian Government from the Canada & Michigan Bridge & Tunnel Company for power to "build a high-level bridge over the Detroit River at Windsor." In this application the cost is estimated at $4,000,000.

Erie & Pacific.—James Finney has the contract for building the bridge for the Erie & Pacific over the Little Otter and the Teal bridge. He will also build a number of small overhead bridges.

Escanaba, Mich.—We noted last week that bids had been asked for a bridge of two steel spans, 100 ft. each, over the Whitefish River in Masonville Township. These bids were received Dec. 10, and the contract was awarded to the Gillett-Herzog Manufacturing Co., of Minneapolis, Minn., at $4,490.

Houston, Tex.—Some time ago we noted the advertisements for bids for an 85-ft. bridge over Buffalo Bayou at Shepherd's Dam. These bids were received on Dec. 9 and the contract was awarded to the Penn Bridge Co., of Beaver Falls, Pa., at a contract price of $2,595.

Indianapolis, Ind.—Bids for the construction of the proposed new Raymond street bridge over White River were to have been opened Dec. 18. The site of the bridge, at the foot of Raymond street, has low and marshy approaches. Commissioner Greer urged a serious objection to the construction of a bridge either at Raymond street or at any other location. He said that there was no money available for carrying out the undertaking. He urged that the 26 bids received be returned unopened to the bidders and that the building of the bridge be postponed. This was done.

Kemptville, Ont.—Surveys for a swing bridge are, it is said, being made by G. F. Martin, of Smith's Falls, Ont.

London & Port Stanley.—The contract for the stonework on the new London & Port Stanley bridge over Zavitz's pond has been awarded to William Gibson, of Beamsville. The ironwork will be erected by the Hamilton Bridge Company, and the whole work will cost about $2,000. Much difficulty was experienced in finding a suitable foundation.

Long Island City, L. I.—The Supervisors of Queens and Kings counties have received notice from the War Department that, unless the condemned bridge spanning Newtown Creek is removed before Jan. 1, 1896, the department will undertake the removal and charge the expense equally to the two counties. Two years ago the War Department pronounced the structure an obstruction to navigation. It connects Manhattan avenue, Brooklyn, and Vernon avenue, Long Island City, and has a heavy wagon traffic. A lift bridge has been proposed, and the contract for its construction was at one time let to the King Bridge Co., being afterward withdrawn, the cost being judged too high.

Louisville, Ky.—Bids were received on Dec. 11 for a steel bridge over Fern Creek. The lowest bid was that of the Louisville Bridge and Iron Co., $274, and the highest that of C. S. Cornwall, of Louisville, $356.

Montague, Me.—The contract for the Howland bridge which is to be built at this place at a cost of about $45,000 has been awarded to the Berlin Iron Bridge Co., of East Berlin, Conn. We noted this award some weeks ago, to Bearce & Clifford, of Lewiston. The latter award was for the substructure only.

New Orleans, La.—A number of bids have been received for a bridge over the New Basin Canal at Claiborne street. The lowest bid for a truss bridge was that of the Gillette-Herzog Manufacturing Co., of Minneapolis, Minn., $10,000, while the lowest for a plate girder was that of the Missouri Valley Bridge & Iron Works, Leavenworth, Kan., $10,795.

New York.—The East River Bridge Commission met Dec. 18, and with the consent of Mayor Strong of this city and Mayor Schieren of Brooklyn and the Comptrollers of both cities, agreed to enter into a contract for the purchase of the charter of the East River Bridge Company, of which Frederick Uhlmann is President, for the sum of $200,000.

Ottawa, Ont.—At the coming session of Parliament the Pontiac Pacific Junction Railway Company will apply for an act to extend its line to Pembrooke and to build over the Ottawa River the necessary bridge.

The Dominion Government has been requested by the City Council to construct a bridge over the Rideau canal at Concession street.

The Ottawa Council have endorsed the proposal of the Deschenes Bridge Co. to build a bridge across the Ottawa River, between Hull and Nepean townships. The Dominion Government will be asked for assistance.

W. T. Jennings, C. E., has deposited with the Railroad Department the plans of a steel bridge, to be built over the Sydenham River by the Erie & Huron.

Pennsylvania Railroad.—A stone arch bridge 186 ft. long, on the Middle Division of the main line of the Pennsylvania near Newport Station, 27 miles west of Harrisburg, is to be widened from two tracks to four. The bridge is in five arches of 25 ft. span each, and crosses the Big Buffalo Creek.

Pittsburgh, Pa.—The viewers in the condemnation proceedings of the city against the Birmingham & Pittsburgh Bridge Company and the Monongahela Bridge Company value the Birmingham and Pittsburgh bridge at $350,000. When the case was before the viewers the city valued the bridge at $270,000, while the bridge company asked $414,000 for the structure. The award in the Monongahela bridge case is $1,286,254.20. The city estimated the value of the structure at $740,000. The city will not accept the viewers' finding.

Queenston, Ont.—Incorporation by the Dominion Government has been asked for the Queenston Heights Bridge Co., for the purpose of constructing a bridge across the Niagara River, at or near Queenston Heights, with arches 60 ft. high.

Rochester, Minn.—We noted recently in these columns the proposed construction of a bridge across the Zumbro River. Bids will be received for this work until Jan. 7. C. H. Wagoner, City Clerk, should be addressed.

Rochester, N. Y.—The question of a bridge over the Genesee River between Wheatland and Rush is being considered by the Supervisors.

Sacramento, Cal.—The new railroad bridge across the river at this city is complete, and all regular trains will now pass over it. The old bridge is to be removed at once. It was completed in 1871, and the first train of the California Pacific passed over it in the same year.

Scranton, Pa.—The Roaring Brook bridge was completed by the Phœnix Bridge Co. recently. The bridge is 900 ft. long, in seven spans. The clearance above the D., L. & W. tracks is 22 ft.; above the L. I. & S. Co.'s., 17 ft. The street car track is on the east side of the bridge. Two of the seven spans are deck spans. Work is well advanced on the Linden street bridge.

Seattle, Wash.—A bridge is to be built in West Seattle, the contract for which has been awarded to Joseph Gandeon.

St. Boniface, Man.—It is said that next year an effort will be made to build a highway bridge across Red River at James or McDermott streets. The Winnipeg City Council will be asked to renew its offer of $10,000 toward its construction.

St. Thomas, Ont.—A deputation consisting of Mayor Idsardi, Aldermen McCully, Wallis, and City Engineer Campbell visited Detroit recently and interviewed President Ledyard, of the Michigan Central, about a subway at Ross street. The company's engineers estimate the cost for roadway and passage for street cars at $24,000.

Toledo, O.—The following bids have been received for the superstructure of a bridge over the canal in Providence Township: Massillon Bridge Company, Massillon, O., $1,235; Ohio Bridge Company, Toledo, O., Plan A, $1,040; Plan B, $1,170; Iron Substructure Company, Columbus, O., $1,260; Brackett Bridge Company, Cincinnati, O, wood joist, $1,190; steel, $1,230. The contract was awarded to the Ohio Bridge Company.

Toronto, Ont.—The representatives of the city and railroad companies have held a conference concerning the York street bridge. The Canadian Pacific was willing to accept stone foundation and iron pillars, but the Grand Trunk insisted on all masonry foundations. It is probable that the matter will be referred to the Railroad Committee of the Privy Council.

Warren, Pa.—The Pennsylvania Railroad bridge on the Philadelphia Division at Warren will be rebuilt in the spring. At present it consists of three spans of wooden Howe truss, of 150 ft. each, single track. It will be replaced by a double track iron structure.

Yankton, S. D.—It is said that surveys have been made for the railroad bridge across the Missouri River at this place.

Youngstown Bridge Co.—The Youngstown Bridge Company, Youngstown, O., is completing a number of bridges for the C. A. & C. R. R., and also for the L. S. & M. S. R. R. as well as for the M. & C. R. R., and the C. P. & V. R. R. They have recently contracted for a rivetted lattice span for the B. & O. R. R., girder work for the A. C. & I. R. R.; three bridges for the C. & M. R. R. in Baltimore. Among other work are three spans for Mobile, Ala., the weir passes for the movable dams on the Great Kanawha River, and structural work for a smelting plant at Lordsburg, New Mexico.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Baltimore & Ohio, semi-annual, 3 per cent. on preferred stock, payable Jan. 2.

Burlington, Cedar Rapids & Northern, semi-annual, 2 per cent., payable Feb. 1.

Canada Southern, 1¼ per cent., payable Feb. 1.

Central Massachusetts, $1.50 per share, payable Jan. 2.

Chicago, Rock Island & Pacific, 50 cents per share, payable Feb. 1.

Michigan Central, 2 per cent., payable Feb. 1.

New York Central & Hudson River, 1 per cent., payable Jan. 15.

Norfolk & Western, quarterly, 1 per cent., payable Jan. 10.

Northern & Southern, quarterly, 1 per cent., payable Jan 10.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Allentown, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Boston & Lowell, annual, passenger station, Boston, Jan. 1.

Chelsea Branch, annual, company's office, Delaware and Federal streets, Camden, N. J., Jan. 6.

Pickering Valley, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Philadelphia & Reading, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Pittsburgh & Eastern, annual, company's office, 141 South Fourth street, Philadelphia, Jan. 13.

Reading & Columbia, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Rome, Watertown & Ogdensburgh, annual, company's office, New York, Dec. 28.

Western New York & Pennsylvania, company's office, 104 South Fifth street, Philadelphia, Jan. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

American Society of Railroad Superintendents.

The Executive Committee of this Society met at Buffalo last week and decided to hold the next meeting of the Society at Niagara Falls on Sept. 9, 1896. Mr. Brunn and Mr. Knibloe, of Buffalo, are the Committee of Arrangements.

Engineers' Club of Philadelphia.

The Club met Dec. 7, with 84 members and visitors present. Mr. John Birkinbine read a paper entitled "Notable Engineering Achievements in the Great Lake Region." He treated the subject in detail, and described the industries of mining, lake transportation, ore docking and hoisting, coal docking and special appliances for the same, harbor improvements, including the new breakwater at Marquette, the St. Mary's ship canal, the Chicago drainage canal, the St. Clair river tunnel, etc., the paper closing with a reference to the work being done at Niagara. There was some discussion after which the meeting adjourned. A regular meeting of the Club was held Saturday, Dec. 21, and a paper was read by Mr. Morrison Souder on "Mines and Plant of the El Carmen Mining Company, Villaldama, Mexico," illustrated by lantern slides.

Engineering Association of the South.

At the annual meeting in Louisville the following officers were elected: President, Mr. Hunter McDonald; First Vice-President, Mr. W. G. Kirkpatrick; Second Vice-President, Mr. J. J. Ormsbee; Secretary, Lucius P. Brown; Treasurer, Mr. W. M. Leftwich; Directors for Tennessee, Maj. E. C. Lewis, Dr. W. L. Dudley, Mr. Herman D. Ruhm; Director for Kentucky, Mr. John B. Atkinson.

The retiring President delivered his annual address on the subject Development of Technical Education in the United States.

The regular monthly meeting was held at Atlanta, Ga., on Dec. 12, in the South Carolina Hall of the Woman's Building at the Cotton States and International Exposition. In the absence of the President, the meeting was called to order by Vice-President Kirkpatrick. The paper of the day was read by Mr. B. M. Hall, on the subject of Gold Mining in Georgia. Mr. Grant Wilkins gave an interesting talk on the engineering features of the Exposition, presenting the members with maps of the grounds.

Engineers' Club of St. Louis.

The annual dinner was given at the Mercantile Club, on Dec. 18, with 45 members and six visitors present. After the dinner, President Russell called the club to order. The result of the letter ballot for officers for 1896 was announced as follows: For President, J. A. Ockerson; for Vice-President, Edward Flad; for Secretary, William H. Bryan; for Treasurer, Thomas B. McMath; for Director, M. L. Holman; for Librarian, W. A. Layman; for members Board of Managers of the Association of Engineering Societies, J. B. Johnson and W. E. Barns. There was no election for the second director.

Retiring President Russell then resigned the chair in favor of the incoming President, Mr. J. A. Ockerson. After brief remarks, President Ockerson called on Mr. Russell for an address, who then spoke on The work of Engineers' Clubs. Other addresses were afterward made as follows: Engineers' Clubs, Their Best Fields of Usefulness, Robert Moore; The Engineer at Home and Abroad, Julius Pitzman; The Engineer of the Future, Richard McCulloch; The Association of Engineering Societies, J. B. Johnson; The Engineers' Club of St. Louis, C. M. Woodward. Mr. George H. Reynolds, of Chicago, being called upon, made brief remarks on The Standing and Character of the Engineer.

Western Society of Engineers.

The committee having in charge the publications of the Society is desirous of creating "topical discussions," of various engineering subjects, the intention being that these discussions will be asked for periodically. With this end in view hydraulic cement has been selected as the first subject. The following queries are submitted, answers to be sent in by Jan. 2:

1. What are the relative qualities of the several Portland and natural cements at present in general use?
2. To what extent is the testing of cements useful in connection with various classes of work?
3. What nature of testing is suitable?
4. What are the essential points which should be covered in specifications as to testing cements?
5. What is the influence of the amount of water used in forming pastes and mortar?
6. How are the several cement mortars affected by cold, both in laboratory and in practical work?
7. How are mortars affected by tempering?
8. What should specifications require as to mortar and mortar mixing?
9. How are cement mortars affected by different qualities of sand?
10. To what extent can cement mortar plasters be relied upon to adhere to cement mortar concretes, especially when Portland cement is used for plaster, and natural cement for concrete?
11. Discuss any other features as to use and quality of hydraulic or natural cements.

The Western Railway Club.

On Tuesday, Dec. 17, the Western Railway Club held its regular monthly meeting at the Auditorium Hotel, Chicago. This was one of the most interesting meetings of the year, the discussion being confined entirely to Mr. Waitt's paper on Air-Brake Equipment of Freight Cars.

Mr. G. W. Rhodes (C., B. & Q.) opened the discussion and, taking up the paper in detail, gave some very interesting figures about his own road. He read letters from his Division Superintendents stating the number of wrecks occurring from the failure of the air-brake hose and also had a number of pieces of ruptured hose as exhibits.

He was followed by Mr. J. N. Barr (C., M. & St. P.), Mr. John W. Cloud (Westinghouse Air-Brake Company), Mr. Paul Synnesvedt (Crane Company), Mr. A. E. Manchester (C., M. & St. P.), Mr. J. C. Stuart (C. & N. W.) and others. Most of them had not experienced as great a number of casualties from the failure of air-brake hose as Mr. Waitt. The discussion was continued over until the February meeting.

In the regular order of business before the discussion, the committee appointed for the purpose of ascertaining whether it would be possible to have a preliminary meeting of the International Railway Congress in this country before the regular meeting in Paris, in 1900, made their report. The paper for the day was on Locomotive Service, presented by Mr. J. H. McConnell, Superintendent of Motive Power of the Union Pacific.

Buffalo Association of Superintendents.

A meeting of this association was held at the Iroquois Hotel on Dec. 19, President T. W. Niles in the chair. There was an informal discussion on block signal practice. Mr. Brunn (Erie) described the Bell code used on his road. He pointed out the absolute necessity of good dis-

cipline, whatever system is used. Mr. Bradley (West Shore), who has used the telegraphic block, managed by station operators, for many years, expressed his belief that a satisfactory automatic system was feasible. Mr. Price (A. V.) believed the Westinghouse pneumatic track circuit the best block signal apparatus. Mr. J. B. Stewart, Superintendent of Signals of the West Shore, called attention to the necessity, in using the Sykes lock and block apparatus, of having the plunger and other parts protected by an iron case and locked up, so that operators could not tamper with the apparatus, and thus avoid the use of proper safeguards. Mr. Bradfield (West Shore) expressed himself in favor of the automatic track-circuit, and held that a distant signal should invariably accompany a home signal. Mr. Brunn described the Mosier apparatus, used on the Erie, in which it is made impossible for the station operator to work the train wire while his outdoor signal is pulled off for the passage of a train. The speaker referred to a certain audible block signal which he deemed all right except that it did not sufficiently provide for switches and side tracks at intermediate points in the block section.

The discussion was followed by the election of officers, which resulted as follows: President, Tracy W. Niles; Vice-President, E. F. Knibloe; Secretary and Treasurer, W. W. Halsey.

PERSONAL.

—Mr. John Muir, Eastern Traffic Agent of the Pacific Mail Steamship Co., has also been made Traffic Manager of the Panama Railroad and its connections.

—The nomination of Mr. Wheelock G. Veazey for another term as Interstate Commerce Commissioner was confirmed by the United States Senate last week.

—Mr. A. H. Gardner has been appointed General Freight and Passenger Agent of the Natchez, Red River & Texas road, with headquarters at Vidalia, La. He has been cashier of the company.

—Mr. Thomas E. Swann, chief clerk in the general passenger office of the Missouri, Kansas & Texas at St. Louis, has been appointed Assistant General Passenger Agent of the Denver & Rio Grande.

—Mr. Leander M. Hubby, a widely known Cleveland business man, who died in that city Dec. 17, was, about 1855, elected President of the Cleveland, Columbus & Cincinnati Railroad, an office which he filled for several years.

—Mr. Walter Hale has been appointed Superintendent of the Montana division of the Great Northern road. Mr. Hale succeeds F H. Britton, who succeeds Mr. J. B. Rice as Superintendent of the Fergus Falls division. Mr. Hale has been roadmaster on this division for several years.

—Dr. John F. Crowell, formerly President of Trinity College, North Carolina, and now Lecturer on Railroad problems in Columbia College, New York City, has become Professor of Economics and Sociology in Smith College, Northampton, Mass. Dr. Crowell retains his connection with Columbia.

—Mr. Charles F. Mayer, President of the Baltimore & Ohio, resigned on Wednesday of last week, and his resignation was accepted, but he will retain office until his successor shall be elected. Mr. Mayer was elected President on Dec. 19, 1888, to succeed Mr Samuel Spencer. He had then been a Director of the company for several years.

—Mr. W. G. Hills, General Superintendent of the Tennessee Midland and the Paducah, Tennessee & Alabama, will, it is announced, continue in charge of the operation of those roads, which are hereafter to be operated by the Nashville, Chattanooga & St. Louis as its Paducah & Memphis Division. Mr. A. J. Welch continues as General Passenger Agent, Mr. G. McFadden as General Freight Agent, and Mr. R. J. Browning as Auditor.

—Mr. E. O. Faulkner has been elected Vice-President and General Manager of the Pecos Valley road, with headquarters at Eddy, N. Mex. He was formerly private secretary to Allen Manvel, and after his death remained with the Atchison in various confidential positions. At the commencement of the receivership he was appointed General Manager of the St. Louis, Kansas City & Colorado, from which he was transferred in July last to perform special duties for the Receivers.

—Mr. Timothy J. Hennessy, after six years of service as State Railroad and Warehouse Commissioner of Missouri, has returned to a position similar to that which he held at the time of his nomination and election to that office, that of locomotive engineer. He retired from the State Railroad Commission last January at the expiration of his term, and opened a store, but this month he began running as locomotive engineer on the St. Louis, Iron Mountain & Southern. Mr. Hennessy's nomination as State Railroad Commissioner was made at the Democratic convention in 1888. He was then an engineer on the Wabash, and had been locomotive engineer for 25 years. He was not prominent in politics, and his nomination was a surprise to him.

—The friends of Mr. L. J. Seargeant, General Manager of the Grand Trunk Railway, gave him a banquet at the Windsor Hotel, Montreal, on the evening of Dec. 17 to bid him good-by before his departure for England. There were over 400 subscribers to the banquet, and the large hall of the hotel was filled with a distinguished company. The Chairman of the evening was Sir Alexander Lacoste, Chief Justice of Canada, and among the others present were Sir Mackenzie Bowell, Prime Minister; Hon. John Haggart, Sir Joseph Hickson, and Sir William Whiteway, Prime Minister of Newfoundland. The Governor-General sent a cordial telegram. There were present a large number of railroad men, including, from the United States, Messrs. John P. Green, of the Pennsylvania; J. D Layng, of the West Shore; Lucius Tuttle and T. A. Mackinnon, of the Boston & Maine, and Dr. W. S. Webb, of the Wagner Palace Car Co. Mr. Seargeant, who has been connected with the Grand Trunk for 21 years, previous to which time he served long terms on various railroads of England, devoted his remarks largely to a review of his long experience in America.

—Mr. William Howard White, M. Am. Soc. C. E., died at his home in Redlands, Cal., Dec 11. Mr. White was about 48 years of age and for the last seven or eight years had done comparatively little work, having been in very delicate health. In fact he went to California with the hope of recovering from consumption. Mr. White was a man who had won an honorable place in his profession, and who had and who merited the esteem of all those who knew him well. At one time he was Assistant Chief Engineer of the Chicago, Burlington & Quincy, and was later Chief Engineer of the New York & New England Railroad. He served a year (1886) as Director of the American Society of Civil Engineers. January and February, 1887, he acted as editor of the *Railroad Gazette*, but his natural candor and great good sense led him to discover very promptly that he had no vocation as an editor. He was, however, a very acceptable writer on technical subjects and in past years contributed a good many valuable articles to the *Railroad Gazette* as well as occasional papers of value to the *Transactions* of the American Society of Civil Engineers.

Mr. White was a man of singular purity of character. He was strictly honest, morally and intellectually, and it is the world's loss that for a good many years he could not do hard work.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The headquarters of the executive officers of the reorganized company will be located as follows: In New York, Chairman of the Board, Aldace F. Walker; Comptroller, John P. Whitehead; Assistant Secretary, L. C. Deming; and Assistant Treasurer, George C. Goodwin. In Chicago, President, E. P. Ripley; First Vice-President, D B. Robinson; Third Vice-President, Paul Morton; Freight Traffic Manager, W. B. Biddle; Passenger Traffic Manager, W. F. White; General Freight Agent, W. A. Bissell; General Passenger Agent, George F. Nicholson; General Solicitor, E. D. Kenna; and General Auditor, W. K. Gillette. In Topeka, General Manager, J. J. Frey; Secretary and Treasurer, Edward Wilder; General Superintendent, H. U. Mudge; and Superintendent of Machinery, John Player. In addition, these officers will have their headquarters in Topeka: Chief Engineer, General Claim Agent, Assistant General Freight Agent, Assistant General Passenger Agent, Superintendent of Telegraph, and Commissioner, Tax Commissioner, Master Car Builder and Superintendent of Car Service.

Cincinnati, Hamilton & Dayton.—At a meeting of stockholders at Cincinnati, on Dec. 20, the following Directors were elected: To represent the Cincinnati, Hamilton & Dayton, Lawrence Maxwell, Jr., Henry F. Shoemaker, Henry A. Taylor and M. D. Woodford; to represent the Southern, M. E. Ingalls, Briggs S. Cunningham, Samuel Spencer and Francis L. Wynde. This made the representation of the two companies equally divided, and as a Director, Samuel Felton, Jr., Receiver of the Cincinnati Southern road, was elected. He was also elected President.

Hartford & Connecticut Western.—The following Directors were elected at a meeting at Hartford, Conn., last week, 15,046 shares being voted: A. A. McLeod, W. R. Taylor, John W. Brock, W. W. Gibbs and Charlemagne Tower, Jr., all of Philadelphia; H. O. Seixas and James Armstrong, of New York; J. H. Appleton, of Springfield, Mass.; Charles E. Gross, of Hartford; Jeffrey O. Phelps, of Simsbury, Henry Gay, of Winsted; Frederick Miles, of Salisbury, and E. W. Spurr, of Canaan, Conn. Mr. Seixas is President.

Northern Alabama.—The officers of this company, which succeeds the Birmingham, Sheffield & Tennessee River road, are as follows: Robert E. Tod, President; John J. Collier, Treasurer; Louis James Phelps, Secretary; Samuel Hunt, General Manager; R. T. Simpson, General Solicitor.

Peoria, Lacon & Northern.—This new company has elected the following officers: President, J. N. McNabb, of Palatine, Judge of Putnam County; Vice-President, Maj. George F. Wightman, of Lacon, civil engineer and ex-City Engineer of Peoria; Secretary, E. C. Howlett, of Peoria; Treasurer, Dr. E. M. McIlvaine, of Peoria; Directors, Messrs. McNabb, Wightman, Howlett, McIlvaine, and R. B. Fort, Mayor of Lacon.

Rumford Falls & Buckfield.—The annual meeting of the railroad was held at Portland, Me., on Dec. 18, and the following officers were elected: Directors, Hugh Chisholm, Portland; F. E. Richards, Portland; G. D. Bisbee, Rumford Falls; Waldo Pettengill, Rumford Falls; G. C. Wing, Auburn; William H. Moulton, Portland; R. C. Bradford, Portland; President, Hugh J. Chisholm; Treasurer, R. C. Bradford.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Brooksville.—The grading on this road is now completed from Wellsbury to Brooksville, Ky., a distance of 10 miles, and track is now being laid. The road extends from the C. & O. at Wellsbury, up Locust Creek to Brooksville, the county seat of Bracken County. It is expected to have the road in operation by Feb. 15, 1896. Younger Alexander is President, Dr. J. W. R. Corlis, Vice-President, and James W. Staton, Secretary. James A. Kelly, of Syracuse, N. Y., is Engineer in charge.

Charleston, Clendennin & Sutton.—Governor MacCorkle, of West Virginia, one of the directors, has just returned to West Virginia from Philadelphia, and announces that he has concluded a contract with a Philadelphia firm for the construction of this road. Fifty miles only remain to be built to complete the road to Sutton, W. Va., where it will connect with the West Virginia & Pittsburgh lines and open up a direct route through the center of the state. It traverses a fine coal-field. Governor MacCorkle thinks that if the winter is favorable, the road will be completed by Aug. 1.

Chickasawba, Luxora & Gilmore.—This company has filed articles of incorporation in Arkansas. It proposes to build a line from Chickasawba, Mississippi County, to Luxora, in the same county, a distance of 12 miles. The capital stock is $100,000. The first Board of Directors consists of B. A. Bugg, L W. Goswell, R. W. Henley, J. H. Borum, R. R. Davis, J. F. Morrow, J. W. Spann, T. G. Brewer and John B. Driver.

Cumberland Valley.—A large force of men has been engaged for some time in widening cuts along the road between Harrisburg and Winchester. At present extensive track improvements are being made in Chambersburg and other main points along the line.

Duquesne & Broughton.—At a meeting of the incorporators on Dec. 20 the surveys of this nine-mile road were approved. It will be a part of the West Side Belt Line Road, at Duquesne, and will extend from Duquesne near the mouth of Thompson's Run, to Broughton on the Baltimore & Ohio. The maximum grade is 1½ per cent. Near Broughton, the branch connects with the Wheeling division of the Baltimore & Ohio. The grade of the new line will be 35 ft. above that of the Baltimore & Ohio, but it is the intention to build a connection so that Baltimore & Ohio cars can carry freight to and from the Duquesne works of the Carnegie Steel Company. The Baltimore & Ohio will also get a connection with the Union Railway line of the Carnegie Company, which will give it an entrance to Homestead, Braddock and Duquesne.

Elkton & Middletown.—It is rumored that work will soon be started again on the new road from Elkton, Md., to Middletown, Del., a distance of about 12 miles, where it will connect with the Delaware division of the Pennsylvania road. This road was built through the town of Elkton last fall, and branches were constructed into several factories, over which a large number of cars are handled. About $75,000 has also been expended for right of way between Elkton and Middletown. The new road will pass through a rich section of country, which is at present without railroad facilities. The Pennsylvania is interested in the project, Samuel Rea, of Philadelphia, being President.

Erie & Pittsburgh.—The Erie & Pittsburgh Dock Co., which owns the docks used by this company at Erie, Pa., on Lake Erie, will rebuild all its ore docks at that point during the winter. The improvements at the docks will include new coal chutes, new hoisting machines and the dredging of a 20-ft. channel around the wharves. In addition a second track will be built by the railroad to the junction with the Lake Shore & Michigan Southern, whose tracks are used for 12 miles between Erie and Girard, Pa. The cost of the improvements is estimated at $100,000. The road is one of the leased lines of the Pennsylvania.

Florence Southern.—The engineers' report and the profile has just been completed by Chief Engineer R. L. Kelly. An excellent route has been obtained into the Wet Mountain valley. The length of the road will be 35 miles. About 23 miles of the line will have a maximum grade of 3.10 per cent. The remainder of the line will consist of a 1.55 and 1.42 per cent. grade. The highest elevation reached in crossing the Green Horn range of mountains is 8,031 ft., only six feet higher than the town of Silver Cliff, while it is 2,835 ft. higher than Florence, the terminal point on the line, the elevation of this city being 5,196 ft. The project is to give a shorter route to Denver, from the Cripple Creek mines, in connection with the Florence & Cripple Creek road, which reaches the mines, but at present carries traffic to Colorado Springs. Mr. W. E. Johnson, of Florence, is President of both companies.

Gulf & Interstate.—The Texas Railroad Commission has authorized the company to issue bonds to the amount of $1,029,000 for 70 miles of road between Beaumont, in Jefferson County, and Bolivar Point, in Galveston County, Tex., opposite Galveston.

Gulf & Ship Island.—S. S. Bullis, of Buffalo, the contractor for extending this road, states that he has signed a contract with Rowles & Dearborn for the building of all bridges and trestles on the line. This firm has been recently working at Port Chalmette for the New Orleans & Western. The first work to be done will be to repair the 20 miles on which rails have been laid, so that the operation of that section may be resumed.

Harriman & Northeastern.—An amendment to the charter of the Harriman Coal & Iron Railway Co., reorganizing it under the name of the Harriman & Northeastern, was filed with the Secretary of State of Tennessee last week, the directors being Isaac D. Funk, President, and James D. Roberts, Clevan Dinges, W. B. Winslow, Lewis T. Freeman, James E. Rodes, Daniel Denny and Don Alexander.

Kansas City, Pittsburgh & Gulf.—Rapid progress is being made with the construction work on this road. The completion of the line to Sallisaw, I. T., will be accomplished early in January, and will give the company a new route via the Missouri Pacific system to New Orleans. A month later the road will be completed further south to Poteau, where connection will be made with the St. Louis & San Francisco. About the same time the construction of the gap between Texarkana & Shreveport will be completed. These extensions are being built by the Arkansas Construction Co. The Kansas City Terminal Construction Co. has been authorized to construct the line south from Shreveport to Port Arthur and Sabine Pass, on the Gulf of Mexico, a distance of some 215 miles. The construction company will receive the bonds and stock of the Kansas City, Pittsburgh & Gulf at the rate of $25,000 for each mile of constructed road. The construction company is to provide the road with rolling stock to the value of $1,500 a mile. The capital stock of the Kansas City Terminal Construction Co is $3,000,000.—*St. Louis Globe-Democrat.*

President E. L Martin has agreed with a committee of citizens of Fort Smith, Ark., to build a branch into that town from the main line. The spur will be 16 miles long and ties have already been purchased for it and the right-of-way is being cleared. The city gives the company terminals and it agrees to begin work at once. The road, when opened, will shorten the distance to Kansas City 100 miles. It will not be opened until the bridge across the Arkansas River at Red Land, I. T., is finished. All the piers are completed and the company expects to run trains across by April 1 and to reach Fort Smith before May 1.

One of the directors, in describing the plans of this company for new construction, beyond Talequah, I. T., opposite Fort Smith, Ark., to which it is now completed, said that the link between Texarkana and Shreveport will be completed in 30 days. The balance of the road will be let in eight sections, and work will be going on in all the sections at one time and will be completed from Kansas City to Port Arthur, Tex., on the Gulf of Mexico, about August, 1896. The syndicate interested in the Kansas City, Pittsburgh & Gulf has purchased the Quincy & Omaha road, from Omaha to St. Louis, and other lines and will complete a line from Kansas City to Trenton, Mo., connecting these roads and securing a line to Kansas City.

The grading for the branch from Port Arthur to the Sabine & East Texas has been commenced. The distance is only five miles. L. J. Smith is the contractor.

Knoxville, Cumberland Gap & Tennessee River.—A charter for this company has been recently issued in Tennessee, the incorporators being the purchasers of the Knoxville, Cumberland Gap & Louisville at the recent foreclosure sale. The road extends north from Knoxville to Cumberland Gap and Middlesborough, Ky., 72 miles.

Lehigh & New England.—It is reported that this company, formerly the Pennsylvania, Poughkeepsie & Boston, and now operated by the Lehigh Valley, will build its own line from Benders' Junction to Pen Argyl, Pa., next spring. It now uses about eight miles of the Lehigh & Lackawanna track between these points.

Midland Terminal.—This road was completed to Cripple Creek on Dec. 19, and the first train from Denver ran direct into the town that day. Previously trains have been running to Victor Junction, five miles north of the present terminus. The work at Cripple Creek was described in our issue of Dec. 13.

New Brunswick Roads.—Dr. J. L. G. Le Bertram, of Brooklyn, has contracted to build 15 miles of railroad from Chipman to Newcastle, N. B. The work will be commenced early next month. Sub-contracts are now being let.

Norfolk & Western.—The company has decided to construct five miles of second track on the Elkhorn division where traffic is heaviest. The improvement will be made between Lyck Branch and North Fork Junction, W. Va. The road will be built in sections of one mile each. The contract for the first section was let to John Sexton, of Roanoke, last week. The first mile to be constructed is from the west end of Crozer's Ovens to Elkhorn Station.

Northern Pacific.—The new track laid (exclusive of second track and sidings), on the lines of this company during 1895, was as follows: United Railroads of Washington, Aberdeen Junction to Aberdeen, Chehalis County, Wash., a distance of 2.61 miles; Northern Pacific & Montana, spur from Whitehall Station, Jefferson County, Montana, to Gaylord, a distance of 5.60 miles; Duluth & Manitoba, extension of Keystone Spur, Polk County, Minnesota, a distance of 2.96 miles, making the total new branch line mileage added during the year 11.17 miles.

Ottawa, Arnprior & Parry Sound.—This season's work commenced the 142d mile west of Ottawa and went to the 162d mile from that city, 20 miles of excessively heavy work, this total length of 162 miles now being open for traffic. The Parry Sound Colonization Railway, which is the Western section of the road, starts from Scotia, on the Pacific Junction branch of the Grand Trunk, and extends westerly a distance of 48 miles to Parry Sound. Forty miles of this has been built during the past three years, and the balance of eight miles will be open for traffic by the new year. Between the 162d mile of the O., A. & Parry Sound road and Scotia on the Parry Sound Colonization road, is a gap of 47 miles yet to be completed. The present intention is that this section (which is very heavy work) shall be built next season, thus completing the whole line from Ottawa to Parry Sound. These roads are controlled by the Canada Atlantic, as is also the Central Counties Railway (Rockland Division) from South Indian, on the line of the Canada Atlantic Railway to Rockland on the Ottawa River, a distance of 17 miles. The president of all the above roads is J. R. Booth, Ottawa; E. J. Chamberlain is General Manager, and Geo. A. Mountain is Chief Engineer.

Pecos Valley.—Construction is to be rapidly pushed on the new extension of the road from Roswell, N. Mex., northeast to a connection with the Atchison, Topeka & Santa Fe, and southwest through the White Oaks Mining district in New Mexico to a connection with the Atchison & Southern Pacific at El Paso, Tex.

Pennsylvania.—The contracts for the work involved in the changes of line on the Philadelphia and Pittsburgh divisions, were awarded late last week. The construction of the Radebaugh Tunnel and the work at Nineveh, (both located on the Pittsburg division), has been awarded to the Drake & Stratton Co., Hale Building, Philadelphia.

The work extending from Lilly to Portage, on the Pittsburgh division, has been divided into four sections and awarded to the following firms: P. McManus, Chas. A. Sims & Co., E. J. Gaynor and W. G. Stahl. The work on the Philadelphia division, from Kinger to Gordenville, has been divided into six sections, and contracts awarded to the following firms: Keller & Crossan, Keller & Hook, T. B Brown, Pennell & O'Hern, B. B. Gonder and E. C. Wells.

The following statement, describing the work to be done by each contractor, under the above contracts, is from the Philadelphia *Press*: B. B. Gonder, of Strasburg, gets the first section, west of Kinzer's: Pennell & O'Hare, of Yonkers, N. Y., the grading of the second section; T. Benton Brown, of Philadelphia, the masonry for the two overhead, two undergrade and two arch bridges on this section. Keller & Hook, of Lancaster, the arch bridge over Pequea Creek to accommodate two additional tracks, and E. C. Wells, of Philadelphia, the grading and masonry of section three, extending from Pequea Creek through Gordonville to end of present four-track system. Keller & Crossan have put a large force of men to work at Mount Joy. The roadbed will be changed and will pass through the middle of the town from end to end. All grade crossings will be avoided and eight iron overhead bridges will be erected. This firm also receive the contract for straightening the line between Rheems and Elizabethtown, which includes a heavy rock-cut. Section one, between Lilly and Portage, was awarded to P. McManus, of Philadelphia; section two to W. G. Stall & Sons, of Altoona; section three to Charles A. Sims & Co., of Philadelphia; section four to Gaynor & Quinn, of Pottsville; section five to P. McManus. This is a heavy piece of work, but by making five contracts, it is expected to complete it by July of next year. The change of line at Nineveh has been awarded to Drake & Stratton Co., who will also build the new tunnel at Radebaugh, west of Greensburg. This tunnel will be 2,100 ft. long.

Mr. J. T. Richards, Engineer Maintenance of Way, has called for bids for enlarging the Spruce Creek tunnel, located on the Middle Division of the main line of the Pennsylvania, 21 miles east of Altoona, Pa. This tunnel was built many years ago and now has two tracks running through it, but as the size of the passenger and freight equipment has increased since the construction of the tunnel, it has not been possible for some years past to run more than one train through it at a time; it has, therefore, been decided to increase the size of the tunnel so that two trains can run through it at the same time, and the bids called for will be opened by Mr. Richards this or next week.

Philadelphia & Erie.—Extensive improvements are to be made during the winter at the company's ore docks at Erie, Pa., the heavy increases in ore and coal shipments requiring much greater facilities for quick handling at this point. The iron ore pier will be extended a distance of 1,300 ft., with a width of 300 ft., and equipped with modern machinery for handling iron ore. The bay will be dredged so as to enable the larger class of vessels to land at these docks. The lowering of Lake Erie, at this port, from 2 to 3 ft., has caused a great deal of trouble to transportation companies in the last few years, necessitating the expenditure of a large amount of money for dredging, as the bottom consists of solid and loose rock, which requires close watching, in order to let the heavy draft vessels enter slips without grounding.

Pittsburgh, Shenango & Lake Erie.—General Manager Blair states that important improvements in maintenance of way will be made during the coming year, including the reduction of grades and the elimination of a number of sharp curves. The most costly work will be near Conneaut, where the road reaches Lake Erie. At that point a new 800-ft. dock will be made ready for the next navigation season

Quakertown & Eastern.—A project for a road across the norhern part of Bucks County, Pennsylvania, under this title, is being actively discussed. As now projected the new line would extend from Quakertown through Richlandtown, Pleasant Valley and Springtown, to the Delaware River, near Riegelsville, and thence along the river to Easton. The new road would form a connecting link with the Poughkeepsie Bridge route to Boston, whereby, it is alleged, it would make the shortest run by 25 miles between Philadelphia and Boston. The projectors of the railroad ask the people living along the line to subscribe to $75,000 worth of stock or bonds. Amount can be raised. John Jamison, a contractor, is interested in the scheme.

Queen Anne's.—Chief Engineer Truxell is now at Lewes, Del., the proposed eastern terminus, with a party of surveyors, and will remain there until the route from Milton to Lewes and from Lewes to Rehoboth is surveyed.

Rio Grande Western.—The company has let a contract for the extension of the Sevier branch of that road, from Salina, Utah, the present terminus, to 30 miles south of that place. The extension will be through a rich mining and agricultural region.

San Francisco & San Joaquin.—The directors have made a fourth call on the stock subscribers. So far only 30 per cent. of the total subscription has been called. The route from Stockton to Bakersfield, the southern terminus, has been located finally, with the exception of a gap in the vicinity of Visalia and Hanford. Chief Engineer Storey gives the following notes of what has been done in the way of construction. "We have a road now to the Stanislaus River 25 miles. It is graded and the rails are laid. The grading camp is quite a distance below the Stanislaus, and the graders are pushing southward at a good rate, so that the road will very soon be graded to the Tuolumne River. The long and high bridge over the Stanislaus is pretty well finished. The steel sections for the drawbridge over Mormon Channel in Stockton are arriving daily. In addition the company has several trains of cars and three locomotives in use, great quantities of building material, including ties, rails, etc., and several cargoes of supplies on the ocean between New York and San Francisco. Grant Bros., the contractors, are working south of the Stanislaus River.

Southern Counties.—Application will be made to the Parliament of Canada at its next session for an act to incorporate this company to construct a road on the south shore of the St. Lawrence River from a point at the northern limit of Chambly County to the city of Sherbrooke, by way of the towns of St. John's and Iberville. Messrs. Bisaillon, Brosseau & Lajoie are the attorneys for applicants.

Ste. Emilie & St. Gabriel.—Raoul Rinfret, C. E., of Montreal, has returned from locating this road from St. Gabriel de Brandon, county of Berthier, to St. Emilie, county of Joliette, Que. The road will be 15 miles long through a mountainous country, but the construction will not be difficult. Work will begin in the spring.

St. Louis, Avoyelles & Southwestern.—The tracklaying was begun at Bunkie, La., last week. The road is being built by New York interests from Bunkie to Simmesport, a distance of 28 miles, and is all graded and the ties laid all along the right of way. Sixty carloads of 56-lb. rails are delivered. Twelve miles from Bunkie, at Long Bridge, a branch to Marksville begins, and runs a distance of 20 miles. It is nearly all graded. The town of Bunkie is on the Texas & Pacific road, 33 miles east of Alexandria. The road will run through a productive country to the Atchafalaya River.

Stockton & Lodi.—Track is now laid out of Stockton, to the San Joaquin River, the distance being eight miles. About 150 men are now employed on construction work. The road to the mines at Corral Hollow will be completed in about two months.

Texas, Louisiana & Eastern.—Work has been resumed on the extension of the road from Fox, its present terminus, in the northwestern part of Liberty County, and will be pushed forward across the Trinity River to Silsbee on the Kansas City, Beaumont & Kansas City road. From the Trinity River eastward the new road extends through fine uncut pine timber. A syndicate is negotiating for the purchase of large tracts of this land.

Tylerdale.—A charter was granted this company at Harrisburg, Dec. 18, to build a line of 1½ miles from the Tyler Tube Works to the Baltimore & Ohio. The capital is $15,000. Samuel Hazlett, of Washington, Pa., is President. Last week the Washington Connecting road was organized to build from the Tyler Tube Works to the Baltimore & Ohio at another point.

Washington County.—The engineers have finished work for this winter on the preliminary surveys for the railroad in Maine. The two surveying parties started at the terminal points of the line and worked toward each other. Active work will not be resumed until spring. The road is now graded to Jonesboro from Machias.

West Virginia Northern.—A despatch from Morgantown, W. Va., quotes a director as stating that the company has decided to extend the road from Kingwood to Morgantown over the so-called "Black Bottle route," which was surveyed several years ago. The work will be begun in the spring. The road will be 20 miles long and go directly through a territory of which the Baltimore & Ohio now makes a circuit. The West Virginia Northern Company has just completed the work of changing the road from Kingwood to Tunnelton, formerly a narrow gage operated as the Tunnelton, Kingwood & Fairchance, to standard gage. Hon. G. C. Sturgis, of Morgantown, W. Va., is President

Electric Railroad Construction.

Augusta, Ga.—The Augusta Street Railway Co. has extended its trolley system to Lake Olmstead, in the suburbs of the city.

Bar Harbor, Me.—The Cherryfield & Milbridge Street Railway Co. has been incorporated by Samuel D. Leavitt, of Eastport; George A. Curran, of Calais; George A. Murche, of Calais; William M. Nash, of Cherryfield; G. R. Campbell, of Cherryfield; James Mitchell, of Portland. The capital stock is $30,000.

Birmingham, Ala.—The Birmingham Railway Co. is preparing to use the trolley line on its Behrens Park division. Mr. Robert Jemison is the manager.

Brockville, Ont.—The Brockville Electric Street Railway Co. has been incorporated with a capital of $200,000. The promoters are W. H. Comstock, W. A. Gilmour, S. Cossitt and others.

Brownsville, Pa.—The Pittsburgh & Monongahela Traction Co. has been incorporated with a capital stock of $12,000, to construct a street railroad between West Elizabeth and Brownsville. M. G. Bulger, of Brownsville, is President.

Chicasawba, Ark.—The Chicasawba, Luxora & Gilmore Railway Co. has been formed by John B. Driver, L. W. Gosnell and others to build a 12-mile road in Mississippi County.

Corry, Pa.—The Corry Street Railway Co. has been incorporated to build an electric road, forming a circuit of nearly four miles in the town of Corry. The capital is $25,000, and Manley Crosby, of Corry, is President.

Dedham, Mass.—The Dedham selectmen voted to grant a franchise to the Norfolk Central Street Railway Company for its proposed railroad to Norwood and West Dedham. The total length of the road will be 10 miles. The capital stock of the company is fixed at $75,000. The directors are: Hon. John R. Bullard, Thomas T. Robinson, Henry C. Delano, Dr. John W. Chase and Ferdinand F. Favor, of Dedham; Francis Doane, of Norwood, and A. A. Whittier, of Boston. It is thought that the new road will be ready for operation by next July.

Detroit, Mich.—Charles A. Parkinson, Cameron Currie and W. J. Gray have been granted a franchise to operate a street railroad from the proposed new bridge across the river Rouge to West End avenue to connect with the present line of the Wyandotte & Detroit Railroad with the Detroit Railway. The franchise provides that six tickets shall be sold for 25 cents.

Digby, N. S.—The New France Milling Co. will build an electric railroad.

Flamboro, Ont.—The township of East Flamboro has offered to submit a bonus by-law for $30,000 and the village of Waterdown one for $6,000 in favor of the proposed International Radial Electric Railway Co.

Guelph, Ont.—The Hamilton Radial Company now gives notice that it will apply to Parliament for power to extend the Guelph branch to Lake Huron.

Hagerstown, Md.—The Harrisburg Constructon Company, which has the contract to build the Hagerstown Electric Railroad, has bought the plant of the Martinsburg Street Railway Company for $10,000, consisting of the rails on three miles of track, three motor cars, three trailers and other equipment, which will be used in the construction of the Funkstown & Leitersburg extension, but not in the streets of Hagerstown.

Jeffersonville, Ind.—A Southern syndicate has purchased the property of the Ohio Falls Street Car Co., Jeffersonville, and will convert it into an electric line.

Jenkintown, Pa.—Plans are being made for an extension of the York Electric Railroad through Jenkintown and the property of the Wharton Switch Co. to Glenside. It is said that the contract for the construction of this line has already been awarded and that it will be built next summer.

Langhorne, Pa.—The Newtown, Langhorne & Bristol Electric Railroad is to be built from Langhorne to Eden this winter, a distance of about three miles, and to be continued to Bristol in the spring.

Los Angeles, Cal.—W. D. Larabee has been granted an ordinance to build an electric line in this city.

Louisville, Ky.—A new electric railroad is to be built between Louisville and Fairfield, which will be 30 miles long. The company will want bridges, rails, rolling stock and power-house estimates. As yet no contracts have been awarded. The new line was surveyed by Chief Engineer Rowland Cox.

Millbury, Mass.—The Millbury, Sutton & Douglas Electric Railroad Co. has been organized to build an electric road from the New Haven steam road's station through Sutton Center, Manchaug and East Douglas to near Douglas station, on the New England railroad. President, James W. Stockwell; Vice-President, Thomas E. Meek.

Montclair, N. J.—Franchise has been granted for the trolley line on Bloomfield avenue, and the work of construction is progressing rapidly.

McKeesport, Pa.—An electric street railroad is to be built next spring, to be known as the McKeesport & Port Vue passenger railroad. The company filed with the borough of Port Vue its acceptance of the ordinance recently passed by that borough, giving the company right of way.

Montreal, Que.—The street railroad company has been granted the permission by the Road Committee to build a line on Mount Royal avenue. The extension will require about four miles of additional track.

Napierville, Que.—The Napierville Junction Railroad, the proposed electric road between St. Remi and Scottville, a distance of 22 miles, is to be completed by July 5 next. Otherwise it loses the bonus of $3,500 a mile given by the Dominion Government, and those of $10,000, $2,500 and $3,000 given by the towns of Napierville, St. Edwards and the town council of St. Remi. The road is chartered to carry freight and passengers.

Newmarket, Ont.—A meeting was held here recently in regard to the proposed Ontario & Lake Huron Electric railroad, at which Mr. Pew, the promoter, stated that he had been requested to extend the line to Goderich by way of Wingham. The Dominion and Provincial Governments have granted bonuses to the extent of $6,200 a mile.

New Orleans, La.—The new trolley line of the St. Charles Street Railway Co. is nearing completion, and it is expected to be in full working order by January 1. Alden McLellan is the President of the new line.

The New Orleans Traction Company expects to have its Levee division trolley line completed and in full working order by next month.

Philadelphia.—Ordinances have been introduced in Select Council to permit the East Philadelphia Street Railway Co., the Enterprise Street Railway Co. and the Western Philadelphia Street Railway Co. to lay tracks on certain streets. All the companies were incorporated May 21, 1889.

Pittsburgh, Pa.—The Pittsburgh, Braddock & McKeesport Company was organized Dec. 18, with a capital of $66,000 to build an electric road from Pittsburgh to McKeesport by way of Braddock, a distance of about 11 miles. It will also pass through Wilkinsburg, Edgewood, Rankin and Duquesne. The Pittsburgh terminus will be at Craig street and Forbes avenue. The directors are: C. H. Johnston, John C. Miller, Walter Fermanis, Wm. Robinson and F. K. Fitler.

The City Incline Plane Co. has been given a charter to build an incline plane from a point on Fourth avenue over the Monongahela to the top of Mt. Washing-

ton. The object is to afford a rapid transit from the business portion of the city to the top of Mt. Washington, at a comparatively easy grade, and without the discomforts of transfers and slow service. Engineer E. K. Morse has prepared plans for the structure which provide for a total length of about 3,500 ft., and a width of 40 ft. with double tracks, and a grade of between 9 and 10 per cent. It is proposed to carry the road over the Monongahela River on a supsension bridge with one span of 1,300 ft., similar in construction to the one being erected at Rochester over the Ohio, which has a stiffening truss. The cars are to be operated by cables, and run at high speed.

Port Perry, Ont.—Among the announcements of applications for railroad legislation is one to incorporate the Huron & Ontario Railway Co., to build an electric railroad from Port Perry to Kincardine, passing through the counties of York, Simcoe, Cardwell, Grey and Bruce.

Quebec, Que.—The act incorporating the Sherbrooke Street Railway Co. has been passed by the Quebec Legislature.

Reading, Pa.—A charter was granted at the State Department last week to the Union Traction Company, of Reading; capital, $400,000. The directors are Samuel E. Rigg, Oliver S. Geiger, James A. O'Reilly, William R. McIlvain and Henry C. England, all of Reading.

Shelton, Conn.—The Shelton Street Railway has been organized, with a capital of $25,000, to build an electric railroad in Shelton and across the Housatonic to connect with the Derby Street Railroad. The directors are Thomas L. Watson and Allan W. Paige, of Bridgeport; W. J. Miller and D. S. Brinsmade, of Shelton, and W. S. Downs, of Derby. General Watson has been chosen President and Mr. Paige Secretary and Treasurer.

Sioux City, Ia.—A franchise has been given to the South Sioux City Traction Co. to build an electric street railroad in that city.

St. Catherine's, Ont.—Lincoln Street Railway, Traction & Light Co. has been incorporated, with a capital of $90,000, to build an electric railroad and to generate electricity for light, heat and power. The incorporators are R. H. Hill, H. A. Kings, J. S. Campbell and others.

Wooster, O.—The Walsh Company has been granted a franchise for an electric railroad from Barberton to the county line at Hametown, over the Wooster road.

Worcester, Mass.—A franchise has been signed by the selectmen of Sturbridge, granting permission to the Sturbridge & Southbridge Electric Railroad to continue its proposed route through Sturbridge Center to a point opposite the Fiskdale Hotel

GENERAL RAILROAD NEWS.

Central Massachusetts.—A special meeting of the stockholders of the company, held at Boston last week, authorized the issue of $100,000 in bonds, bearing interest at five per cent., to be used in carrying out the terms of the agreement with the Boston & Maine in relation to the settlement of permanent improvements on the Central Massachusetts road. The stockholders' vote was merely a ratification of the directors' action.

Chicago & Carbondale.—This road has been formally purchased by the Chicago & Texas Railroad, with which it connects at Johnson City, in Southwestern Illinois. The line is about 20 miles long and has just been completed to Carbondale. It was built as an extension of the Chicago & Texas, the interests in the two companies being practically the same.

Cincinnati, Jackson & Mackinaw.—The local attorney of the Central Trust Company, of New York, has filed a bill in the United States Circuit Court, at Cincinnati, to foreclose a mortgage for $4,616,300 on this road. Frank B. Drake is now receiver of the road under appointment of another court. This petition prays for a receiver of the whole system and the sale of the property as an entirety. This suit is understood to be a part of the plans of Senator C. S. Brice for the reorganization and development of the property. This suit will be consolidated with that of Nelson Robinson, under which Receiver Drake was appointed in December, 1894. The mortgage held by the trust company, and which is to be foreclosed, was given to secure bonds issued in June, 1892.

Lake Shore & Michigan Southern.—The company reports these earnings for the year ending Dec. 31, the last month partly estimated:

	1895.	1894.	Inc. or Dec.
Gross earn	$20,813,903	$19,557,869	I. $1,256,034
Oper. exp	14,425,428	13,186,067	I. 1,239,361
Net earn	$6,388,475	$6,371,802	I. $16,673
Fixed charges	3,360,000	3,402,863	D. 42,863
Balance	$3,028,475	$2,967,990	I. $59,536
Dividend	2,967,990	2,968,930	.....
Surplus	$60,485	$949	I. $59,539

Expenses include all expenditures. Nothing has been charged to construction or equipment since 1893. The funded debt has been decreased during the year $250,000, by the operation of the sinking fund. The profits were equal to 6.12 per cent. on the stock, against 6 per cent. for the previous fiscal year.

Michigan Central Railroad.—The company reports earnings as below for the year ending Dec. 31, December partly estimated:

	1885.	1884.	Inc or Dec.
Gross earn	$13,550,000	$12,584,003	I. $965,600
Oper. exp	10,070,000	9,141,000	I. 926,000
Net earn	$3,480,000	$3,440,000	I. $40,000
Int. and rentals	2,100,000	2,401,000	D. 1,000
Surplus	$1,080,000	$1,039,000	I. $41,000
Pro. to C. S	304,000	288,000	I. 16,000
Pro. to M. C	776,000	751,000	I. 25,000
Other income	49,000	45,000	I 4,000
Net income	$825,000	$796,000	I. $29,900
Dividends	749,520	749,520	.....
Balance	$75,480	$46,480	I. $29,000

Middlesex Valley.—This road, recently acquired by the Lehigh Valley, will hereafter be operated as the Middlesex branch of the Pennsylvania & New York division of the company. The road extends from Geneva to Naples, N. Y., 29 miles. The road was built as an independent line from Naples to Stanley some years ago, and was completed to Geneva last summer.

Nashville, Chattanooga & St. Louis.—This company has leased from the Louisville & Nashville, the recent purchaser, the Tennessee Midland road, extending from the Tennessee River to Memphis, and the Paducah, Tennessee & Alabama Railroad from Paducah, Ky., to Lexington, Tenn., as narrated in another item. Possession of these roads has been taken by the lessee.

New York Central & Western.—The statement of earnings for the quarter ending Dec. 31, makes the following comparisons:

	1895.	1894.	Inc. or dec.
Gross earn	$12,387,000	$11,318,228	I. $1,068,772
Oper. exp	8,418,500	7,378,958	I. 1,039,542
Net earn	$3,968,500	$3,939,270	I. $29,230
Fixed charges	2,650,500	2,627,462	I. 23,038
Profit	$1,318,000	$1,311,808	I. $6,192
Dividend	1,000,000	1,192,853	D. 192,853
Surplus	$318,000	$118,955	I. 199,045
Six Months Ending Dec. 31.			
Gross earn	$23,987,500	$22,159,050	I. $1,828,450
Oper. exp	16,164,500	14,493,716	I. 1,670,284
Net earn	$7,823,500	$7,665,334	I. $158,166
Fixed charges	5,281,000	5,257,614	I. 23,386
Profit	$2,542,500	$2,407,720	I. $134,780
Dividend	2,000,000	2,385,707	D. 385,707
Surplus	$542,500	$22,013	I. $520,487

The amount earned on the stock for the quarter was 1.32 per cent., against 1.37 per cent. for the corresponding quarter of last year, and for the six months 2.54 per cent., against 2.52 per cent. for the first half of the previous fiscal year.

North Carolina.—A suit to test the legality of the lease of the North Carolina road to the Southern Railway Company has been brought by the Farmers' Alliance in Raleigh, N. C.

Northern Alabama.—The organization of this company, which succeeds the Birminghom, Sheffield & Tenneesee River road, has been completed, the new officers being given in another column. The control of the road was formerly held in Philadelphia, but New York interests appear to be the largest security holders of the new company. It owns about 120 miles of road in Northern Alabama, between Sheffield and Parrish, on the Tennessee River, and has been operated by E. A. Hopkins, of Philadelphia, as Receiver, since June, 1893.

Northern Pacific.—The receivers report earnings for October and the three months to Oct. 31, as follows:

	1895.	1894.	Inc. or dec.
Gross earn	$2,707,935	$2,420,131	I. $287,804
Oper. exp	1,145,055	1,247,202	D. 102,147
Net earn	$1,562,880	$1,172,928	I. $389,952
Other income	28,316	46,311	D. 17,995
Total income	$1,591,196	$1,219,239	I. $371,957
Int., rentals and taxes	186,759	194,957	D. 8,198
Charges paid	496,991	709,547	D. 212,556
Charges accrued	330,144	131,092	I. 199,052
Surplus	$577,300	$184,343	I. $392,957
July 1 to Oct. 31.			
Gross earn	$8,294,859	$7,162,133	I. $1,131,725
Oper. exp	4,197,005	4,133,666	I. 63,338
Net earn	$4,097,854	$3,029,467	I. $1,068,386
Other income	127,783	171,012	D. 43,228
Total income	$4,225,637	$3,200,479	I. $1,025,158
Rentals, taxes, etc	696,849	696,323	I. 525
Surplus	$3,528,788	$2,504,155	I. $1,024,632

From Aug. 16, 1893, to Oct. 31, 1895, the gross earnings were $40,172,831; operating expenses, $25,577,826; net earnings, $14,595,005; other income, $1,341,122; total, $15,936,127; interest, rentals and taxes, $3,949,448; balance, $11,986,678; charges paid, $10,800,890; surplus, $1,185,788; charges not assumed, $11,248,084; deficit, $10,062,295.

Philadelphia & Reading.—The Junior Securities Protective Committee, R. M. Galloway chairman, has indorsed the plan for reorganization formulated by the Olcott-Earle Committee, and outlined in this column last week.

Paducah, Tennessee & Alabama.—This road and the Tennessee Midland passed from the control of Receiver Huse, of St. Louis, and Receiver Overton, of Memphis, to the control of the Nashville, Chattanooga & St. Louis, last week. President Milton H. Smith, of the Louisville & Nashville, gives the following statement in regard to the transfer of control:

"The properties were recently purchased at judicial sale by Judge J. W. Phillips, of St. Louis, and were by him sold to the Louisville & Nashville. As the location of the roads renders their operation by the Nashville, Chattanooga & St. Louis Company more advantageous than if operated by the Louisville & Nashville, a lease has been made by which the Nashville, Chattanooga & St. Louis Railway Company will operate the lines." The Louisville & Nashville owns stock of the Nashville, Chattanooga & St. Louis.

Quebec Central.—At a general meeting of five per cent. prior lien holders in London, recently, the directors were authorized to seek an amendment to the company's charter, to allow an issue of additional bonds, to the amount of £50,000. The chairman, in his address at the meeting, said that when the present company took over the line it was in a state of chaos, and the £300,000 raised at that time had been spent in improvements. In September last the construction of the branch line to Megantic, Que., 60 miles long, was finished. The new capital would be expended in providing rolling stock, and in improving the shops. The company also proposed to acquire a wharf on the St. Lawrence River at Levis, which, it was hoped, would result in a great saving to the company.

Tennessee Midland.—This road, extending from Memphis to the Tennessee River and recently operated by the Paducah, Tennessee & Midland under a lease to that road, will hereafter be operated by the Nashville, Chattanooga & St. Louis, as is stated in an item in this department under the latter name.

Electric Railroad News.

Cincinnati, O.—The Consolidated Street Railway Company will erect a large plant for building its own cars. Three hundred men will be employed.

Portland, Me.—The Portland & Cape Elizabeth Railway Co. has filed a trust mortgage to cover an issue of $400,000 worth of bonds, to bear five per cent. interest. The provisions are that $250,000 worth of bonds shall be at once turned over to the company; $50,000 delivered from time to time, and $100,000 delivered when the company has 15 miles of track in operation.

Quebec, Que.—The shareholders of the Montmorency Light and Power Co., at a meeting held on Dec. 11, decided to accept the offer of the Electric Street Railway Company for the purchase of the stock and franchise of the former company.

Reading.—The directors of the new Union Traction Company have elected James A. O'Reilly President and William R. McIlvain Secretary. The new company agrees to pay the Reading Traction Company a rental of $10.000 annually for the first three years, $20,000 for the next two years and $30,000 a year thereafter.

San Francisco, Cal.—An electric car driven by a storage batery was tested on the narrow-gage track of the belt railroad recently.

TRAFFIC.

Traffic Notes.

It is reported from San Francisco that the rate war between that city and Portland, Or., has been settled. Rates were to be restored on Dec. 25.

The Allegheny Valley road has placed on sale at all stations between Pittsburgh and Kittanning 10-trip tickets at rates about one-third less than those for single fares.

On Monday a large number of coal boats started down the river from Pittsburgh, the water having risen to 9 ft. 1 in. About 20 million bushels of coal had been for many months waiting to go down.

The shipments of corn by water from New Orleans in November amounted to 1,607,539 bushels, the number of vessels sailing with corn being 28. In November, 1894, there were no shipments of corn whatever.

On the ferryboats between Philadelphia, Pa., and Camden, N. J., operated by the Pennsylvania Railroad, a charge of three cents will hereafter be made for bicycles. A bicycle and its rider will be carried for five cents.

Sixty days' notice has been given by the Seaboard Air Line of its intention to withdraw from the Southern States Freight Association. Vice-President St. John's letter giving this notice says that the Seaboard withdraws because the organization of the association has not been completed in that a new Arbitration Committee has not been elected and there is a deadlock over the matter.

According to the *Evening News*, of Newport, Ark., a 34-ft. car was recently loaded at that place with 60,904 lbs. of cotton. There were 115 bales, compressed by the Bierce hydraulic press, and the average density of the cotton was 35 lbs. per cu. ft. The average weight of the bales is said to have been 530 lbs., so that at 35 lbs per ft. they must have measured only about 15 cu. ft. each. The car was 8 ft. 3 in. wide and 7 ft. 5 in. high.

Chicago Traffic Matters.

CHICAGO, Dec. 23, 1895.

The representatives of lines members of the Trans-Continental Passenger Association have been in session for a week endeavoring to straighten out the tangle in Colorado-Utah affairs, but thus far without success. Tests of the "market" in various cities prove the charge of the Rio Grande Western that the scalpers are well provided with tickets of Union Pacific issue. These tickets the Union Pacific has agreed to clear the market of, but the Rio Grande insists upon its competitor proving its assertions by "good works" before it will withdraw the complaint.

The Passenger Committee of the Central Traffic Association has agreed upon a report to be submitted to the General Managers for ratification, which provides that all passenger business west of the Western termini of the Trunk Lines and north of the Ohio River shall be placed in the hands of Chairman Donald, of the present association.

Western Freight Association lines have agreed that cars of grain must be loaded up to within 10 per cent. of the marked capacity, and never less than 24,000 lbs.

There are fewer indications of cutting in eastbound rates than a week ago and it is expected that everything "in sight" will be en route by the 1st of January, when the new joint traffic agreement goes into effect.

Traffic officials find no encouragement that there will be any immediate large increase in tonnage. More cribbing of corn is being done than was anticipated, and the unsettled state of finances tends to prevent any considerable movement in general merchandise. In consequence they have made up their minds that it is going to be necessary to "worry along" as best they can for several months yet to come.

The total shipments of all freight from Chicago except live stock eastbound, last week, were 90,577 tons, as against 83,996 tons the week before and 39,877 tons for the same week in 1894. The Michigan Central took 11,705 tons; Wabash, 6,205; Lake Shore, 16,074; Pittsburgh, Fort Wayne & Chicago, 7,077; Pittsburgh, Cincinnati, Chicago & St. Louis, 9,434; Baltimore & Ohio, 5,860; Chicago & Grand Trunk, 14,050; Nickel Plate, 7,060; Erie, 8,283, and C., C., C. & St. L., 4,829. The increase of more than 6,000 tons over last week, which was itself a big increase over the preceding week, is taken as an indication that the secret reductions in rates are still in force.

Traffic Through the Soo Canals, Season of 1895.

Items.	Season. 1894.	Season. 1895.	Inc. or Dec. Amount.	Inc. or Dec. P.c.
Vessels	14,491	17,956	I. 3,465	24
Tonnage, freight, total	13,195,860	15,062,580	I. 1,866,720	14
Passengers	27,236	31,656	I. 4,420	16
Coal, hard, tons	532,870	440,477	D. 92,393	17
Coal, soft, tons	2,264,314	2,133,885	D. 130,429	06
Flour, bbls	8,965,733	8,902,302	D. 63,471	01
Wheat, bu	34,869,483	46,218,250	I. 11,348,767	33
Grain (other than wheat) bu	1,545,008	8,328,694	I. 6,783,686	C
Iron, tons	60,659	100,337	I. 39,678	65
Salt, bbls	237,461	269,919	I. 32,458	14
Copper, tons	99,573	107,452	I. 7,879	08
Iron ore, tons	6,548,876	8,062,209	I. 1,513,333	23
Lumber, M ft. b. m.	722,788	740,700	I. 17,912	02
Silver ore, tons	412	100	D. 312	..
Building stone, tons	21,417	23,876	I. 2,459	11
Unclassified freight, tons	451,185	463,308	I. 12,138	03

The American Canal was open to navigation 231 days, and during the season of 1894 three days more.

The foregoing table includes the traffic through the Canadian canal, which was opened September 9 and closed December 4, 1895, completing a season of 87 days.

Note (C)—The item of "Grain, other than wheat" in this season's report includes such eastbound grain as was heretofore reported as unclassified freight; therefore no percentage is given.